RAILROAD GAZETTE

FRIDAY, JANUARY 24, 1879.

Train Accidents in December.

The following accidents are included in our record for the month of December:

REAR COLLISIONS.

On the morning of the 1st a Fitchburg freight train backing through the Troy & Greenfield yard, at North Adams, Mass., ran over a misplaced switch and into another freight standing on a siding. Three box cars and a new locomotive were damaged.

On the morning of the 4th a passenger train on the Pittsfield & North Adams Branch of the Boston & Albany ran into a freight car which had been left standing on the track in Pittsfield Mass.

On the night of the 5th a freight train on the Lake Shore & Michigan Southern road ran into some gravel cars which had, in some unknown way, been run from a siding out upon the main track at Dover, Mich. The engine and 20 cars were badly broken, a brakeman hurt and the road blocked six hours.

On the morning of the 8th a freight train on the Nashville, Chattanooga & St. Louis road broke in two at the top of the long grade at Cumberland Mountain, Tenn. The engineer did his best to keep ahead, but the men on the rear section were unable to hold it and it ran into the forward section near the foot of the grade and fourteen cars were thrown over, several of them going down 50 feet over the stone retaining wall. The conductor and a brakeman were hurt, and the track blocked all day.

On the morning of the 9th, as a passenger train on the Metropolitan Elevated road was crossing from the south-bound to the north-bound track at the Rector street station in New York, it struck an engine which stood on the north-bound track and had not been run far enough up to clear the switch. Both engines were damaged and the track blocked nearly an hour.

On the morning of the 10th a Lake Shore & Michigan Southern freight train ran into a preceding freight at East Buffalo, N. Y., wrecking several cars. There was a thick fog at the time.

On the evening of the 14th a passenger train on the Metropolitan Elevated road ran into the rear of another train, which was being shifted from the up to the down track at the Fifty-seventh street station in New York. Some damage was done.

On the afternoon of the 16th a freight train on the Pittsburgh, Fort Wayne & Chicago road ran into the rear of a preceding freight in Allegheny, Pa., wrecking a box car.

On the 21st a freight train on the Cleveland, Columbus, Cincinnati & Indianapolis road ran into the rear of a preceding freight near Galion, O., wrecking several cars and blocking the road eight hours.

On the afternoon of the 21st a passenger train on the Harlem Division of the New York Central & Hudson River road ran into the rear of a local freight, which had stopped at Williamsbridge, N. Y. The engine, baggage-car and several freight cars were badly broken, the fireman fatally hurt and three others slightly injured. A signal had been sent back, but was not seen.

On the morning of the 22d a passenger train on the Pittsburgh, Fort Wayne & Chicago road ran over a misplaced switch and into some freight cars on a siding in Fort Wayne, Ind. Several box cars were wrecked and the road blocked three hours.

On the night of the 22d a freight train on the New York Central & Hudson River road ran into a preceding freight which had suddenly stalled in a snow-bank near Albion, N. Y. The engine and several cars were wrecked and the track blocked all night.

Early on the morning of the 23d an Ohio & Mississippi passenger train, backing over the bridge from Jeffersonville, ran into a Jeffersonville, Madison & Indianapolis freight standing at the Prison Station in Louisville, Ky. Some damage was done and the engineer of the passenger train fatally hurt.

On the 23d a freight train on the Grand Trunk road broke in two near Penton, Ont., and the rear section afterward ran into the forward one, wrecking several cars and killing two brakemen.

On the afternoon of the 23d a passenger train on the New York Central & Hudson River road ran into a preceding passenger train which had stopped near The Forks, N. Y., to avoid a freight train stalled in the snow ahead of it. The rear car, in which were a number of railroad workmen, was wrecked, one man killed and seven others hurt. The driving snow was as thick as a fog at the time.

BUTTING COLLISIONS.

On the morning of the 3d there was a butting collision between a passenger and a freight train on the Winona & St. Peter road, near Claremont, Minn. Both engines and several cars were badly broken. It is said that the freight conductor's watch was no less than 26 minutes slow.

On the night of the 7th a stock train on the Pennsylvania Railroad ran into the head of a coal train, which was going into a siding at Wall's, Pa., and both engines and eight cars were badly damaged, blocking the road several hours.

CROSSING COLLISIONS.

On the morning of the 17th a Winona & St. Peter freight train ran into a Chicago, Milwaukee & St. Paul freight at the crossing of the two roads in Winona, Minn. The St. Peter engine and two cars of the St. Paul freight were badly damaged. The St. Peter train did not make the usual stop at the crossing, the train-men claiming that the track was so slippery that the brakes would not hold the train.

On the evening of the 18th a New York, Lake Erie & Western freight train ran into a New York Central & Hudson River freight at the crossing of the tracks at Black Rock, near Buffalo, N. Y. The Central engine was thrown over and badly damaged and 15 cars of the Erie train were thrown from the rails. The Central engineer and fireman were hurt.

DERAILMENT, BROKEN RAIL.

On the morning of the 24th three cars of a passenger train on the Port Royal & Augusta road were thrown from the track by a broken rail near Early Branch, S. C., and two of the cars upset and were much damaged.

DERAILMENT, DEFECTIVE JOINT.

On the 9th a passenger train on the Michigan Air Line road was thrown from the track by a defective rail-joint near Romeo, Mich. The train was wrecked, one man killed and five others hurt.

DERAILMENT, BROKEN WHEEL.

On the evening of the 7th a car in a local passenger train on the Delaware, Lackawanna & Western road was thrown from the track at the west end of the Bergen Tunnel, N. J., by the breaking of a wheel.

DERAILMENT, BROKEN TRUCK.

On the morning of the 3d two box-cars of a mixed train on the McMinnville & Manchester road were thrown from the track at McMinnville, Tenn., by the breaking of a truck under one of them. Both cars were wrecked, some hogs killed, and the road blocked six hours.

Late on the night of the 6th ten cars of a freight train were thrown from the track near Retreat, Ind., on the Jeffersonville, Madison & Indianapolis road, by the breaking of a truck.

DERAILMENTS, SPREADING OF RAILS.

On the morning of the 2d the engine of a passenger train on the St. Joseph & Denver City road ran off the track near Elwood, Kan., and upset. The engineer was caught under it and fatally hurt. The accident is said to have been caused by the spreading of the rails.

On the afternoon of the 26th a local passenger train on the Philadelphia & Reading road was thrown from the track near St. Clair, Pa., by the spreading of the rails.

DERAILMENTS, WASH-OUT.

On the afternoon of the 10th a freight train on the Troy & Greenfield road ran into a wash-out at West Deerfield, Mass., the engine and six cars going down into the gap. The engineer was hurt.

On the afternoon of the 10th a freight train on the Connecticut Central road ran into a wash-out at Shaker Village, Conn. The engine went down into the gap and five cars piled up on top of it in a bad wreck. The engineer, fireman and a brakeman were hurt.

On the evening of the 10th a passenger train on the Boston, Concord & Montreal road ran into a wash-out at Sewall's Falls, N. H., and the engine was thrown down a bank. The baggage and one passenger car were piled up together, and badly broken, the engineer, fireman and five passengers hurt.

On the night of the 10th an engine and caboose on the Housatonic road went into a wash-out near Van Deusenville, Mass., and the tender and car were wrecked.

On the night of the 10th a passenger train on the Rutland Division of the Central Vermont went into a wash-out near Brockway's Mills, Vt. The engine jumped nearly across the gap and fell on its side and the baggage car landed on top of it. The fireman and express messenger were killed, the baggage-master fatally hurt, the engineer and seven others less severely injured.

Late on the night of the 10th an express freight train, drawn by two engines, on the Boston, Concord & Montreal road ran into a gap at Wentworth, N. H., where a trestle bridge had been swept away by a sudden freshet. Both engines went down together and were wrecked.

Early on the morning of the 11th a freight train on the Pittsburgh Division of the Baltimore & Ohio ran into a wash-out near Laughlin, Pa., and the engine and several cars were piled up in a bad wreck. A brakeman was badly hurt, and the road blocked all day.

On the morning of the 11th a passenger train on the Southern Central road ran into a wash-out near Sterling, N. Y., wrecking the engine and baggage car, killing the fireman, injuring the engineer and four passengers, the latter all slightly.

DERAILMENTS, SNOW OR ICE.

On the afternoon of the 14th a passenger train on the Wabash road was thrown from the track at Tolono, Ill., by ice on the rails. Seven cars left the track and some of them were badly damaged. The road was blocked 11 hours.

On the 21st some cars of a freight train on the Indianapolis, Cincinnati & Lafayette road ran off the track in a snow-drift near Lawrenceburg, Ind., blocking the road several hours.

On the evening of the 23d a passenger train on the New York, Lake Erie & Western road, drawn by three engines, ran off the track near Suspension Bridge, N. Y., and one of the engines turned over into the ditch and was badly broken. The engineer and fireman were hurt. The accident is said to have been caused by snow packed down on the rails.

On the morning of the 26th a snow-plow and three engines on the New York & Oswego Midland road ran off the track in a drift near Fulton, N. Y. The plow was wrecked, killing one laborer and injuring another fatally.

On the night of the 30th two engines and a snow-plow on the Rome, Watertown & Ogdensburg road ran off the track in a drift near West Camden, N. Y., and one engine was badly damaged.

DERAILMENTS, MISPLACED SWITCH.

Early on the morning of the 22d, the engine and baggage-car of a passenger train on the Grand Trunk road were thrown from the track and wrecked by a misplaced switch at Forest, Ont. The engineer was killed and the fireman hurt.

Early on the morning of the 31st three cars of a passenger train on the St. Louis, Keokuk & Northwestern road were thrown from the track in Hannibal, Mo., by a misplaced switch. Five persons were slightly hurt.

On the morning of the 31st the engine and two cars of a freight train on the Mobile & Girard road were thrown from the track in Columbus, Ga., by a misplaced switch. The engineer was thrown down and badly bruised.

DERAILMENT WITH MALICIOUS INTENT.

On the 2d a freight train on the Seattle & Walla Walla road was thrown from the track near Renton, Wash. Ter., by a switch which had been purposely misplaced.

DERAILMENTS, UNEXPLAINED AND MISCELLANEOUS.

On the morning of the 1st a passenger train on the New York Central & Hudson River road ran off the track in Utica, N. Y., causing considerable delay.

Very early on the morning of the 2d the engine of a passenger train on the Boston & Albany road ran off the track in Springfield, Mass., delaying the train two hours.

On the morning of the 3d the engine of a freight train on the New York, Lake Erie & Western road ran off the track near Rutherford, N. J., delaying trains some time.

On the evening of the 3d the engine of a freight train on the Pittsburgh, Cincinnati & St. Louis road ran off the track in Pittsburgh, Pa., blocking the road an hour.

On the night of the 5th two cars of a freight train on the Pittsburg, Fort Wayne & Chicago road ran off the track in Fort Wayne, Ind., doing some damage.

On the 6th the engine of a passenger-train on the Cincinnati, Sandusky & Cleveland road ran off the track at Findlay, O., and upset upon the turn-table, doing much damage and injuring the fireman slightly.

On the 10th three cars of a freight-train on the East Tennessee, Virginia & Georgia road, ran off the track near Strawberry Plains, Tenn., tearing up the rails for some distance. The cars went down a bank. The road was blocked several hours.

On the 12th eight cars of a freight-train on the New York, Lake Erie & Western road ran off the track on the Tip-top Summit, near Hornellsville, N. Y., blocking the road an hour.

Early on the morning of the 17th a freight-train on the Boston & Albany road got off the track on a long temporary trestle, built over a wash-out at Huntington, Mass. Several cars went off and were in such a position that a staging had to be built up before they could be put on the track again, so that the road was blocked nearly 12 hours.

On the night of the 17th a car of a passenger-train on the New York, Lake Erie & Western road ran off the track near Forestville, N. Y.

On the morning of the 18th the engine of a freight train on the Erie & Pittsburgh road ran off the track at Rock Point, Pa. The tender broke loose and turned over, carrying the engineer with it and breaking his leg.

On the morning of the 21st the engine and some cars of a freight train on the Atlantic & Great Western road were thrown from the track in the yard at Salamanca, N. Y.

On the afternoon of the 24th the engine of a freight train on the St. Paul & Pacific road ran off the track in St. Paul, Minn.

On the 26th the engine of a freight train on the Lehigh Valley road jumped the track on a sharp curve near Tomhicken, Pa., and fell over on its side. The engine was badly broken, the fireman and a brakeman killed, the engineer and a trackman badly scalded.

About noon on the 26th four cars of a freight train on the Rensselaer & Saratoga road ran off the track near Round Lake, N. Y., and ran along on the ties until they came to a cattle-guard, when the first one upset and the others were piled up on top of it, making a bad wreck.

On the morning of the 28th some cars of a freight train on the New York, Lake Erie & Western road ran off the track near Rutherford, N. J., blocking one track nearly two hours.

On the 31st the engine of a freight train on the St. Louis, Keokuk & Northwestern road, ran off the track near Canton, Mo., blocking the track three hours.

BOILER EXPLOSION.

On the evening of the 16th, as a freight train on the New York, Lake Erie & Western road was stopping for water at Lordville, N. Y., the crown-sheet of the fire-box gave way, and steam and fire were driven out through the fire-box door, fatally scalding a brakeman who was in the cab.

OTHER ACCIDENTS.

On the afternoon of the 26th the engine of a coal train on the Delaware, Lackawanna & Western road broke a connecting rod when near West End, N. J., doing some damage.

On the 31st a mail car in a passenger train on the Lake Shore & Michigan Southern road caught fire when the train was near Girard, Pa., and was destroyed.

This is a total of 63 accidents, whereby 16 persons were killed and 58 injured. Eleven accidents caused the death of one or more persons; 12 caused injury, but not death, while in 40, or 63.5 per cent. of the whole number, no serious injuries are recorded.

As compared with December, 1877, there was a decrease of three accidents, an increase of eight in the number killed and of 32 in that injured.

These accidents may be classed as to their nature and causes as follows:

COLLISIONS:		
Rear collisions	15	
Butting collisions	2	
Crossing collisions	2	
	—	19
DERAILMENTS:		
Unexplained	17	
Broken rail	1	
Defective rail-joint	1	
Broken wheel	1	
Broken truck	2	
Spreading of rails	2	
Wash-out	8	
Snow or ice	5	
Misplaced switch	4	
	—	41
Boiler explosion		1
Broken connecting-rod		1
Car burned while running		1
Total		63

Two collisions were caused by misplaced switches; two by cars standing on main track; two by trains breaking in two, and one each by fog, by snow and by a conductor's poor watch. Of the four misplaced switch derailments one was purposely caused, and that was the only malicious accident recorded. Eleven accidents are traced directly to defects or failures of road or equipment.

Three collisions were between passenger trains; five between a passenger and a freight and eleven between freight trains. Eighteen derailments were of passenger and 23 of freight trains, and of the other accidents one was to a passenger and two to freight trains. The 19 collisions killed five and injured 15 persons; the 41 derailments killed 10 and injured 43, while in the three other accidents one man was killed.

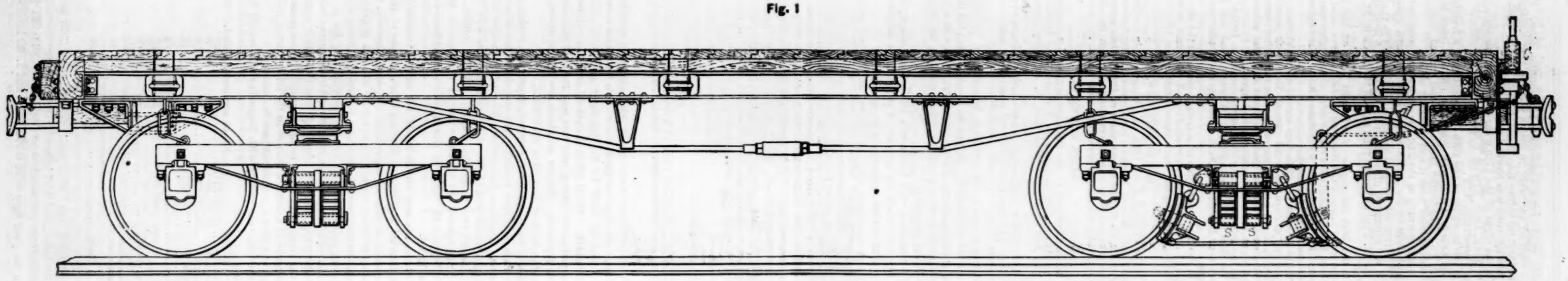
The month was, on the whole, not an unfavorable one, and the number of accidents was not large. Some of the usual causes of derailment are absent, but, unfortunately, the misplaced switches remain always with us, and doubtless will, until the standard of discipline is raised on many roads and greater pains taken to fix the responsibility for such accidents. Eight wash-outs were caused by the great rain-storm of the 10th, 11th and 12th, and doubtless many minor accidents from that storm escaped record. Snow made its appearance as a cause of trouble in the latter part of the month, and will play a prominent part in January.

For the year ending with December the record is as follows:

	No. of accidents.	Killed.	Injured.
January	75	23	77
February	67	8	31
March	49	5	14
April	46	12	55
May	50	13	44
June	56	12	58
July	54	7	41
August	75	36	108
September	76	22	53
October	61	35	163
November	68	15	54
December	63	16	58
Total	740	204	756

The averages per day were, for the month, 2.03 accidents, 0.52 killed, and 1.87 injured; for the year, 2.03 accidents, 0.56 killed, and 2.07 injured. The average casualties per accident for the month were 0.254 killed and 0.921 injured; for the year they were 0.276 killed and 1.022 injured.

Fig. 1



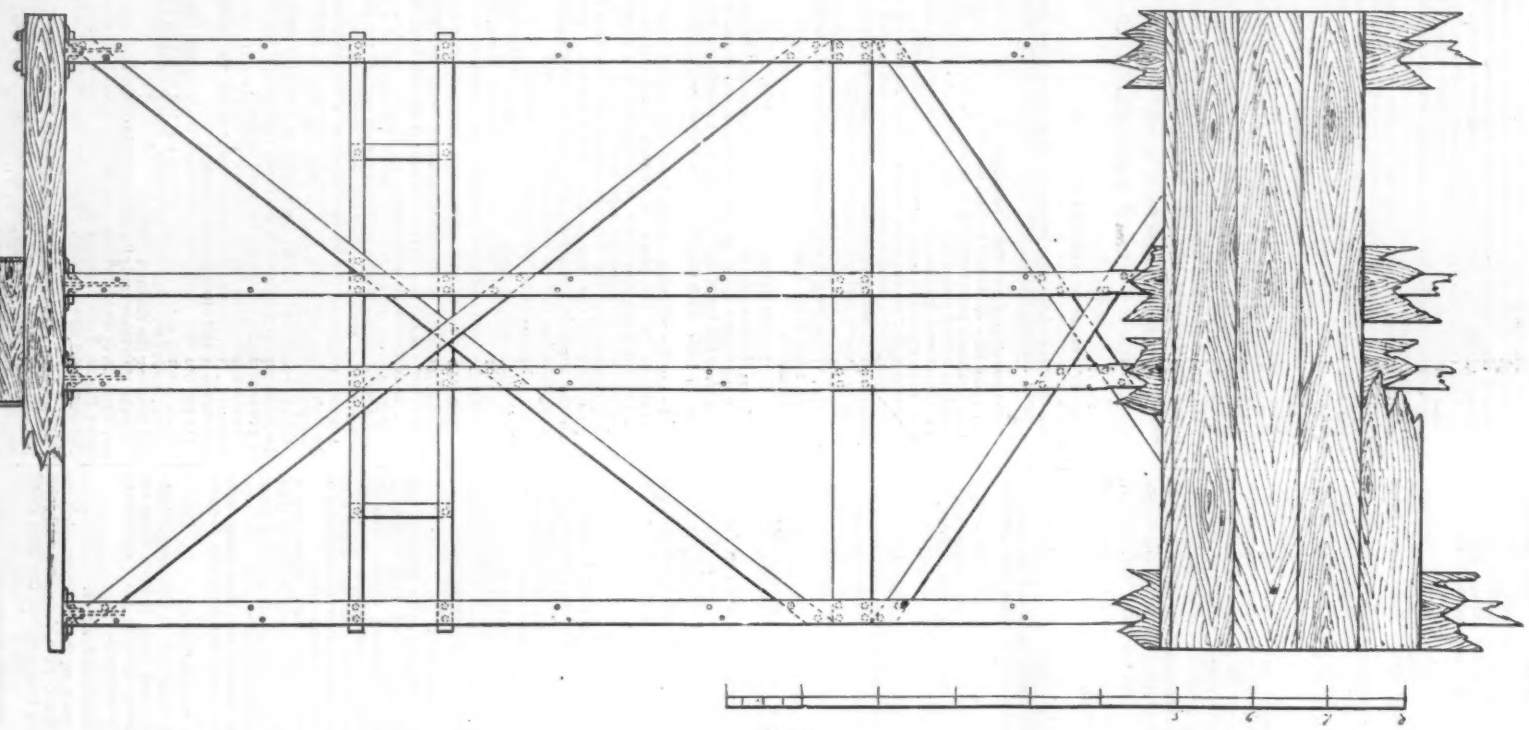


Fig. 2.

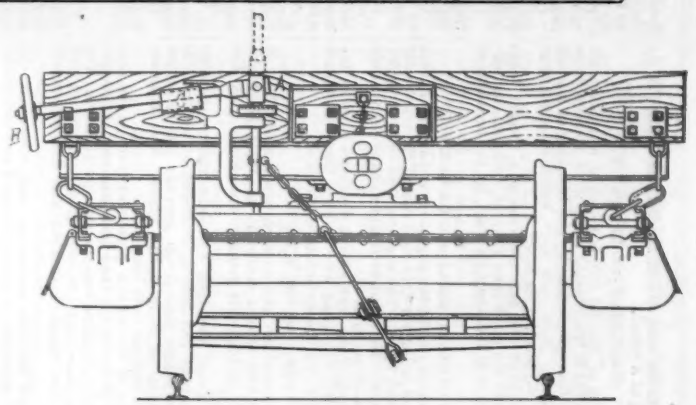


Fig. 3.

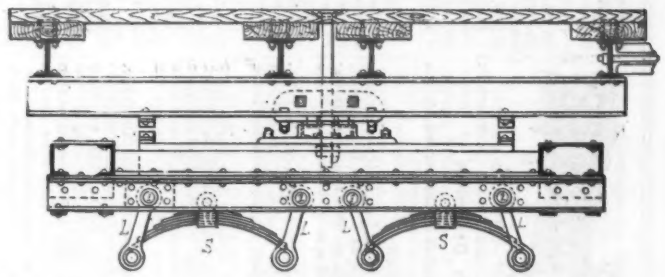


Fig. 4.

IRON CAR:

Designed by Messrs. Kellogg & Seaver, Buffalo, New York.

Iron Car.

The engravings given herewith represent an iron car designed by Messrs. Kellogg & Seaver, of Buffalo, N. Y. Fig. 1 is a side elevation, fig. 2 a plan, fig. 3 an end view and fig. 4 a transverse section, the latter showing the arrangement of the swing-motion of the truck.

The main or floor frame of the car consists of four longitudinal I beams—shown in section in fig. 4—which are trussed underneath in the usual way. The end sills, the body bolsters and the cross-bearers are made of channel iron. The end and longitudinal sills are joined together at the corners by angle irons or knees, which are riveted to the longitudinal sills and are fastened to the end sills by bolts which pass through a stick of timber, with which the end sill is faced, and the nuts on the bolts bear on washer plates on the outside of this end timber. Nailing strips are attached to the top of the longitudinal I beams, and are fastened to the latter by ∩ bolts, the form of which is shown in fig. 4. The nailing strips are also tenoned into the end wooden cross pieces. The wooden flooring is then spiked to these nailing strips.

Each body bolster is formed of two channel bars, placed edgewise, with their upper flanges riveted to the lower flange of the longitudinal I beams, and is strong enough to support its load without trussing. The cross-bearers, or needle-beams, consist of channel bars placed flatwise, and with the web riveted to the I beams. The rivets which fasten them to the I beams also pass through castings which form queen-posts for the truss rods. The diagonal pieces shown in fig. 2 are made of flat bars riveted to the lower flanges of the I beams.

The draw-bars are made of wrought iron, the face and jaws of each are formed of solid die forgings, thus securing as much strength with as few welds as possible. The centre plates can be made of cast iron of any form now in use, but a wrought-iron plate forged in a die, of any approved form, and which would weigh only about half as much as one made of cast iron, is preferred.

The top side bearings are iron forgings, and are riveted to the under side of the body bolsters.

The brakes, which may be hung either to the body or to the trucks (the latter method is preferred by the designers of the car), are of the ordinary pattern.

The arrangement of the brake-stem or shaft is novel. In fig. 3 it will be seen that it is made with a hinge at *A*, below the top of the floor, so that the shaft and wheel *B* can be turned down into the position shown, so as to be out of the way in loading lumber or other freight which would be obstructed by the brake-wheel and shaft. A loose collar, *C*, is placed on the shaft, and when the latter is raised to its vertical position, as shown at *C*, in fig. 1, the collar is slid down over the hinged joint, so as to make it rigid and hold it in a vertical position.

The wheels and axles are the same as those now in use, excepting that the latter are increased in size so as to correspond with the loads they are designed to carry.

The truck frames consist of a pair of channel bars on each side, which are trussed with two flat bars of iron. The channel bars therefore act only as compression members, the load being carried by the truss rods. The form and position of these channel bars and truss rods are shown in figs. 3 and 4. The oil-boxes have each a broad flange cast on the upper side by which they are fastened with bolts to the channel bars with jam-nuts underneath, so that by unscrewing the latter the boxes can readily be removed when wheels or axles must be changed.

The truck transoms or cross-frames consist of a combination of channel-bars, plates and angles which are riveted together so as to prevent the truck from "getting out of square," which is a prolific cause of hot journals.

When check-chains are used they are attached to cross-bolts which pass through the two channel-bars which form the truck frame, as shown in fig. 3.

The arrangement of the springs, shown in fig. 4, is somewhat peculiar. These consist of two pairs of semi-elliptic springs, *S S*, suspended by links *L L*, which are attached to the channel-bars which form the truck transoms by pins 1, 2 and 1, 2, which pass through the webs of these bars. The bars are reinforced by plates, riveted to their webs. The ends of the springs are bent around and form eyes, in which thimbles or collars of wrought iron form journals for the pins in the lower ends of the links from which the springs are suspended. The spring-beam or truck-bolster, which consists of two channel-bars, rests on top of the springs, and is secured to them by pins which pass through the bands of the springs and forged jaws riveted to the bottom of the truck-bolster. Angle iron is riveted to the transoms, forming guides for the truck-bolster. In case the springs are overloaded, the truck-bolster will rest on the upper pins by which the links are suspended, and in case a spring or a link is broken, the upper pins would support the bolster.

It is intended that all the parts of such cars shall be made to metal gauges and templates, so as to be interchangeable.

The strength of such parts as admit of calculation have been carefully worked out, and where this is not possible past experience has been followed. The ends of sills and other abutting pieces are to be faced off square and true in length. The riveting is to be done by hydraulic machinery.

It is estimated that a car of this kind will carry 40,000 lbs. load, and that it will weigh less than those in use at present.

Messrs. Kellogg & Seaver seem to have employed to some advantage their experience and knowledge in the use of iron shapes for bridge construction in the design of this iron car—a kind of knowledge of which many of those who have attempted to build such cars have been singularly deficient. Further information concerning the cost, etc., of these cars will be furnished by Messrs. Kellogg & Seaver, Buffalo, N. Y.

Since the above was written, we learn that patents have just been granted to Messrs. Kellogg & Seaver on this car.

Contributions.

Some Ready Rules.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A valuable if not a large note-book might be filled with those useful factors and ready data wherewith engineers daily perform, on the spot, calculations which would occupy hours if worked out, in the office, by means of more complete formulæ. Such, to the engine-builder, are data like these:

A thirty-horse stationary engine (condensing) has a 30-in. cylinder and a 3-in. piston-rod. Boilers for stationary engines require one square foot of grate surface, one square yard of heating surface, and one cubic yard of capacity for each horse-power, and each horse-power requires an evaporation of one cubic foot of water per hour. These are old enough and empirical enough, but they are "rules" which dispense with a great deal of calculation.

In other cases the convenience is not less in knowing that the number of cubic feet of water discharged per minute, on a given fall, multiplied by the height of the fall in feet, and divided by 700, gives the actual horse-power of a good water-wheel. By multiplying the number of cubic feet of water discharged per minute over any weir or through any channel by 9,000, the number of gallons discharged in twenty-four hours will be ascertained.

The tractive force of a locomotive-engine may often be found by a ready mental calculation, by multiplying the square of the diameter of one cylinder in inches by the pressure in pounds per square inch, again multiplying the product by the length of the stroke, and dividing the final product by the diameter of the driving-wheel. This simple rule is given by Pambour, and it is strange that we so seldom find an engineer employing it. In order that those who would be most benefited by employing it may have confidence in it, the following explanation of its derivation will be given:

It is needless to say that the area of a circle is found with equal correctness either by multiplying the square of the diameter by 0.7854, or by multiplying half the diameter by half the circumference. Taking the latter mode of finding the area of piston, and instead of looking for the actual circumference, let it be represented by n times the diameter, or as dn. Then $\frac{d}{2}\cdot\frac{dn}{2}$ = area of piston, and as there are two pistons the pressure on both will be $\frac{d}{2}\cdot\frac{dn}{2}2p$.

This pressure is exerted through twice the length of the stroke, and its effect is diminished at the rail in the proportion that the circumference of the driving wheel or Dn exceeds twice the length of the stroke, or $2l$. The formula, therefore, becomes

$$\frac{\frac{d}{2}\cdot\frac{dn}{2}2p2l}{Dn} = \text{tractive force.}$$

It will at once be seen that this may be readily contracted to $\frac{d^2pl}{D}$, a form in which neither the area nor the circumference is required. Most engineers can, in their minds, square any whole number up to twenty, and, therefore, for a seventeen-inch cylinder, $17^2 = 289$, the first quantity in the equation is easily found. It is not difficult either to multiply this in the mind by 50, 75 or 125 lbs. per square inch, as may be required in an ordinary estimate. Then if the stroke be two feet, and the driving-wheel six feet, the product of d^2p need only be divided by 3, although if the stroke be 22 in. and the wheel 5 ft. 7 in., d^2p must be multiplied by 22, and the product divided by 67. In many cases, however, the calculation may be readily made in the mind.

Knowing the pitch of a screw propeller, any one standing near the engine-room may determine the vessel's speed in knots, very nearly, by multiplying the pitch, in feet, by the number of revolutions per minute, pointing off two decimal places and allowing, say one-sixth, for slip. This ready rule is obtained in this way: A nautical mile is 6,080 ft., which may be called 6,000 ft. for calculations not absolutely exact. The hourly speed of a screw steamer, disregarding slip, would therefore be the pitch of the screw multiplied by the number of revolutions per minute, the product multiplied by 60 for the number of minutes in an hour, and the final product divided by 6,000 for feet, nearly, in a nautical mile. But as multiplying a number by 60, and dividing by 6,000, amounts to no more than pointing off two decimal places at once, we have the short rule given above.

The speed of a railroad train may be determined by counting the number of telegraph poles passed in a certain time, there being on the average 32 to the mile. In bridging, however, there are the greatest number of ready rules, some of which appear inexplicable at first sight, although they may all be traced to fundamental principles. In the case of arch bridges, no matter what may be the outward form of the actual arch adopted, the line of strain or thrust will not differ greatly from a parabola, and hence the thrust at the abutments may be ascertained, instrumentally, by raising a line at the centre of the arch to a point twice as high above the springing as the rise of the arch itself, and drawing lines from this point to each of the abutments. Thus, with an arch of 20 ft. rise, find a point 20 ft. above the soffit and extend lines from that point diagonally downward to the springing point at the centre of pressure upon the skewbacks.

By as much as each of these lines exceeds in length twice the rise of the arch, so will the thrust on each skewback exceed half of the whole weight of the bridge. If the bridge is of iron, with several ribs, each rib will be treated as a bridge itself, the proportionate share of the whole load being at first ascertained. This mode of arriving at the strains may generally be gone through with in the mind without the aid of diagrams. If the radius of a segmental arch, in feet, be multiplied by the weight per running foot upon that arch, the product will nearly express the horizontal strain at the crown of the arch. Thus for one arch of 200 ft. span and 20 ft. rise, the radius will be found to be 260 ft., and if the weight of the bridge and load be three tons per foot run, the strain at the crown will be 780 tons, nearly, or three times the length of the radius of the arch.

In girder bridges or trusses whose depth is exactly one-eighth of the span, the strain in the top and bottom chords, at the centre of the span, is exactly equal to the whole weight of the truss and its distributed load. Thus a truss of 200 ft. span and 25 ft. deep, weighing with load 300 tons, will have a strain of 300 tons at the mid-length of both the top and bottom flanges. If the depth of the truss be one-twelfth, the strain will be to the whole amount (as above) as 12 : 8. If the depth be one-fourteenth, the proportionate strain will be as 14 : 8. In girder bridges it happens that the strain in tons per square inch in the bottom flanges or chords, due to the weight of the bridge above, is approximately equal to one-one-hundredth of the span in feet. The strain in the iron in the bottom of the Britannic tubes, of 460 ft. span, would be thus $\frac{460}{100} = 4.6$ tons, which is almost the exact strain per square inch actually due to the weight of the bridge itself. In a span of 100 ft. the approximate strain would be one ton per square inch. This result applies only to tubular or girder bridges, as commonly made, and of a depth equal to from one-twelfth to one-thirteenth the span.

Such data as that ⅛-in. plate iron weighs 10 lbs. per square foot, and that one square inch of section in a railway bar or wrought-iron beam weighs 10 lbs per yard, are conveniently useful at times, and may be added to the miscellaneous collection here thrown together. Some of the rules for calculating horse-power are very simple, but the result when obtained is of but little value.

J. O. BUERK, M. E.

Distribution of Weight on Mogul Engines.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Being a subscriber of your valuable paper, and welcoming its weekly visits with pleasure, and reading in it opinions, *pro* and *con*, in regard to the designs and workings of the Mogul engines, I will state some facts that have come under my observation. Having occasion to take the one I have off of its wheels, I found the back driving-box brasses ⅛ in. thick, the centre ones 1/16 in. thick, and the forward ones 1 in. thick. During the time of service there had been three pairs of truck brasses worn out on a 5-in. axle. The time of service was about two years and six months. I think I have read that some builders claim to distribute the weight uniformly upon driving-wheels, but how it is done I cannot understand. Neither can I understand, when the weight is on the back axle and forward truck, where the benefits come in of the extra pairs of driving-wheels. As much sand has to be used to produce adhesion as with the eight-wheel engines, with no better results. Dimensions of engine, 18 × 24 in., 56-in. wheels, 6 wheels coupled. J. L. D.

[In the absence of any description of the arrangement of the springs and equalizing levers, or of the distribution of weight on the wheels, it is impossible to say what is wrong with the Mogul engine which our correspondent is using. That there is something wrong is indicated by the unequal wear of the brasses. The weight on the driving-wheels can be equalized just as perfectly on a Mogul engine as on an ordinary eight-wheeled American engine. The method of equalizing the latter is described on pages 310 to 313 of the "Catechism of the Locomotive." If our correspondent would give the location of the wheels of his engine in relation to the fire-box, their distance apart, and a description of the arrangement of the springs and equalizing levers, or, better still, give a drawing of them, it might be possible to throw some light on the cause of the trouble of which he complains.—EDITOR RAILROAD GAZETTE.]

Did the Conductor Haul the Train?

POUGHKEEPSIE, N. Y., Jan. 15, 1879.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Nov. 29, 1878, I read an item of remarkably fast time made by Mr. Seneca Green, conductor on the Chicago, Milwaukee & St. Paul Railway. What I wish to know is, was Mr. Green coupled to that train, and did he actually make the time mentioned, or was there a locomotive attached with an engineer and fireman on it? This matter of crediting so much to one man who only did his part is ungenerous, not only to his associates, who did as much, but to the conductor himself, if he has any generosity in his make-up. J. L. D.

The New York, Lake Erie & Western.

The following is from the report of the President, Mr. H. J. Jewett, and has special interest as giving his views on the condition and prospects of the property in his charge:

THE UNION STEAMBOAT COMPANY.

The Union Steamboat Company is a chartered corpora-

tion, created and empowered to own and operate a line of steam vessels on Lake Erie and the upper lakes. It now owns a fleet of sixteen steamers and two schooners, of an aggregate tonnage of 19,478 tons. All the stock of the steamboat company being owned by this company, it is managed entirely in its interests. The profits that may be made are devoted to the enlargement of the fleet. The experience of the owners of steam vessels on the lakes is in favor, on the score of economy, of large vessels; and the policy of this company is, as fast as may be prudent, to dispose of its smaller boats, or in building new vessels to make them of the largest size, having surplus power to act as tugs. The company is now building a steam vessel 200 feet long; 37 feet beam; tonnage, 1,850 tons; estimated cost, $100,000.

The main line of this company, through the vessels of the steamboat company, has access for about eight months in the year to all the lake ports on the most favorable terms, and thereby secures this company for such time from any unfavorable action by other railway companies, over which it has no control beyond its own terminus.

NEW YORK & GREENWOOD LAKE RAILROAD COMPANY.

The Montclair & Greenwood Lake Railroad Company—of which the above-named company is the successor—owned a railway running for about forty miles nearly parallel to and within a few miles of the main line of this company, and contributing to the terminal and ferry earnings of the Pennsylvania Railroad Company, at Jersey City. The position of this road was such—being forced to a sale—that it possibly might fall into the possession of parties hostile to the interests of this company, and thereby disorganize local rates, without, in the end, benefiting either the people or the companies. It was therefore thought desirable to secure a controlling interest in the new company to be formed by the purchasers of the property, at a cost of $206,927.50, that, without prejudicing the interests of other parties, unnecessary injury to the interests of this company might be avoided, and that this company might have the further advantage of the contributions of the business of this road to its terminal and ferry earnings at Jersey City and New York.

NEW ENGLAND CONNECTION.

The Boston, Hoosac Tunnel & Western Railroad was to have been completed by the first of November, 1878, but on account of unforeseen hindrances the opening of this line for business cannot now be anticipated before the latter part of the coming spring. When this road is finished it will furnish a connection between the main line of this company at Binghamton and the New England system of railroads by means of the Albany & Susquehanna Division of the Delaware & Hudson Canal Company, the Hoosac Tunnel, and the Fitchburg Railroad and connecting railroads. It is reasonable to expect a large increase of traffic on that part of your main line west of Binghamton, coming from and going to New England.

RATES OF THROUGH FREIGHT AND PASSENGERS.

The arrangement made in the summer of 1877, between the trunk lines, for a division of freight from the city of New York to the West, is still in operation, and has secured to the parties to it a fair division of the freight at remunerative rates.

The rates on east-bound traffic from Western points have been for the year very irregular. The competition between the railways, and between the railway and the water communication, has kept rates at very low figures. It is hoped that an equitable plan for dividing the eastward through tonnage will secure higher rates at reduced expense.

Passenger rates have been reasonably uniform during the year, and though very low, yet have paid some profit.

Railway managers have, perhaps, not valued the cost of their passenger service as high as a proper regard for all the elements of cost would warrant. The public is being accommodated with increased speed, improved cars, more comfortable stations, etc., without increase of charge, while the volume of travel has not increased in proportion to make up for increased expense.

THE MAIL SERVICE.

The earnings for mail service were, in 1875–6, $400,077.09; in 1876–7, $348,070.86, and in 1877–8, $170,778.63. This falling off in earnings has been altogether due to reduction in the price paid by the government for such service. It is to be regretted that no fair measure has been adopted by Congress which would justly apportion the remuneration to the railway companies for services performed in transporting the mails and giving all the facilities required by the Post-Office Department. The general government has no more claim on the railway companies chartered by the states for special favor than the individul citizen. Yet an impression has prevailed that in some way the railways were subject to the general government in this respect. It is right and proper that the railway companies should furnish every possible facility that may be required, as well for their own profit as that, standing largely in the place of the public road, and to a certain extent having a monopoly as a common carrier, they owe it to the people of the country to advance this means of intercommunication, on the rapidity and certainty of which the social and business interests of the country largely depend. The railway companies appreciate the delicacy of their position, standing as they do, between the people and the government, and they are not unaware of the unpopularity that would follow any movement to delay or stop the transportation of the mails. Yet the manifest injustice with which they have been treated by Congress, if continued, will force the railway companies to make such a representation of the facts to the public that the people of the country, the recipients of the benefits of mail transportation by railway, will demand that the railway companies shall be fairly paid. It is to be hoped that the enlightened judgment of Congress will, at its approaching session, enact laws that will correct the injustice of the present enactments, and on a fair business basis secure to the railways proper remuneration for work done.

BASIS OF PROSPERITY.

The shareholders should understand and fully appreciate the basis on which the future value of their property rests.

The profits of a railway are determined by the amount of tonnage and number of passengers carried; by the price received for such service, and by the cost of transporting such tonnage and passengers. Other things being equal, the cost of transportation per ton and per passenger is reduced by an increase of business. Two objects are thus before your directors. First: To increase the gross earnings by increase of traffic on your lines; and, second, to reduce the cost of transportation, that through such reduction of cost the company may be able to offer inducements to travelers and shippers of freight to use their lines of railway, and more particularly in the direction of local business, by which alone can a reliable revenue be secured.

It may be accepted as true, that hereafter the rates on through freight will be kept at low figures, and that railway companies must look for their profits more to an increase of tonnage than to an increase of rates. This increase of traffic must come as the population of the country grows, as its resources are developed, as the necessities of the people require increased interchange of commodities, and with an enlarging foreign demand for our varied productions.

These low rates will prevail, owing to the competition between the great lines of railway extending from the Atlantic seaports to every part of the tonnage-producing regions of the West, and also, and probably in the future, more to the competition coming from the great chain of lake, river and canal communication on the north and the prospective competition from the improvement of the rivers of the West and South.

The surplus productions of the Western country, affording an immense tonnage, come eastward in large quantities, making full train-loads, with a minimum cost of transportation and will be carried by competing railways at prices but little in advance of the actual cost, the balance left after paying cost of transportation being considered, however small it may be, as so much clear again, the principal reliance of such companies for profit being on their local traffic.

To successfully meet competition under such conditions the property of this company must be brought up to the same standard for economical working already established by the railways with which it competes. Its local business must be encouraged and built up to a point of profit that the foreign or through traffic may be transported on equal terms, and at rates determined by the principles already alluded to, which regulate the prices of competing railways.

PROSPECTS FOR LOCAL TRAFFIC.

Geographically your lines of railway are favorably located to build up a large local traffic. Your main line, skirting the great anthracite coal fields of Pennsylvania, with ready access to their numerous basins, by many branches and connections, must continue to carry over its line a satisfactory proportion of the coal destined for New York city and its surrounding country, for the East, the North and the Northwest. This tonnage will increase with the enlarged consumption of coal, and will bring with it to the lines a large collateral addition in freight and travel.

The proximity of your railways to the oil regions of Pennsylvania, to the bituminous coal property owned by your company, and to the steam and gas coals of that state, as soon as the proposed extension of the Buffalo, Bradford & Pittsburgh Railroad can be built, will yield increased tonnage as yield of oil continues, and the demand grows for these coals and the oil at home and abroad.

On the Eastern Division of your road are many and large deposits of magnetic ore. The ability, through your railways, to bring together at and near the Hudson River these ores and the coal to smelt them, at a low cost, with cheap transportation in every direction to consumers, should, on a revival of the iron interest, induce manufacturers to avail themselves of the advantages offered by your company.

Much of the country penetrated by your railways is rich and increasing in its production of tonnage in the shape of cheese, fruit, butter, milk, wines, etc. The high and healthy ground, extending from Passaic to Sufferns, offers inducements to manufacturers of every variety of goods, wares and machines, to establish shops and factories, and to persons desirous of securing homes within easy reach of the city of New York.

From many points on your lines of railway, access and intercommunication can be had with all parts of the state of New York, as well as with all other parts of the country, whether East, West or South.

The free use of branch lines is necessary to develop and increase this local business. The extent of country made tributary to your main line depends on the number and length of the branches and connections with other standard-gauge roads. The region thus controlled will gradually afford increased freight and travel, and may in time cause the branch lines to show a decrease of loss. In this connection, it must be borne in mind, that while the results on the branch lines, as shown in this report, may be unfavorable, yet as feeders to the main line may be accepted as desirable.

The railways of your company have thus all the elements on which to build up a very large and profitable local business.

THROUGH TRAFFIC.

The connection of your system of railways for through traffic with the West, so far as it can be reached by the Lakes, is complete through the Union Steamboat Company, belonging to this company. The connections with the West by rail might be much improved, and your directors anticipate before long more satisfactory arrangements. The completion of the standard gauge from Jersey City to Buffalo will very soon enable the cars of this company to reach all the shipping points in the West, and when the Atlantic & Great Western Railroad Company's lines are narrow-gauged, your cars will be on an equality with the cars of all competing lines.

The ability to command the highest development of the tonnage-producing capacity of the country through which your lines of railway pass, the greatest increase of local passenger travel, and the amount of tonnage and travel between the East and the West, and *vice versâ*, that can be drawn to your lines, depends, then, on the prices at which you can profitably carry the passengers and transport the tonnage, and thereby foster, encourage, and develop such local and through travel and freight.

IMPROVEMENTS REQUIRED.

The above considerations properly bring up the question: What improvements are needed on your lines of railways, and what will be the cost to enable the company to reduce the charges for services rendered to at least as low figures as those of competing companies?

It is proper to notice the fact that the property now belonging to you has suffered greatly from the frequent changes of ownership and administration.

To secure economical administration of a railway property a continued management under competent officers is absolutely essential. A continuous management under less able superintendence will produce greater economies and better financial results than frequent changes under the most able administration.

REPAIR SHOPS.

The repair shops are not adapted to the present requirements of economical management, and a radical re-arrangement will have to be made, which will involve the erection of a principal shop with all the modern facilities of improved machinery, for the accuracy and promptness of work, and the saving of labor.

Some changes will also have to be made in the secondary shops. Safe and commodious buildings must be erected to house and protect from injury the locomotives when not in service. The round-houses, imperfect as they are, are insufficient to hold the locomotive engines now in use. The result is, not only injury to the machines from the continued exposure to the weather in summer and winter, and therefore greater cost of repairs, but increased cost in keeping up fires during the winter months.

The cost of repairs on locomotives and cars, and the liability to accident will continue to be heavy, while the necessity of keeping up rolling stock suited to two gauges of track continues. The policy adopted in the laying of the third rail included using the wide-gauge until the rolling stock adapted to it was worn out, or the gauge of the Atlantic & Great Western Railroad Company was changed. All new locomotives, either purchased or rebuilt, and all new freight cars are of the standard gauge. Yet there are on the road so many engines and cars of so many different patterns that it will require some years before all the rolling stock can be brought up to the present requirements. During this time the cost of maintaining the rolling stock will be much in excess of what it would be were such stock reduced to adopted standards.

THE ROAD.

The gaps in the double track on the main line, between Jersey City and Buffalo, amounting to 110 miles, must be closed up, and by the introduction of additional sidings in the form of an intermediate third track as required, the tonnage-passing capacity of the rails and the tonnage carrying power of the locomotives and cars will be much increased by reducing the liability to detention of trains and lessening the time per trip of the rolling stock on the road. As aids in securing such regularity and safety of train-service, the necessary signal arrangements must be constructed, and advantage taken of every improvement that will facilitate the movement of trains. The alignment and grades on the main line between Jersey City and Buffalo are susceptible of great improvement by straightening the road, thereby avoiding heavy curvature, and by change of location reducing the grades. The unnecessary interpolation of exceptional heavy grades at one or more points on a division deter mines the load of an engine over that part of the line. With a moderate expenditure of money the Eastern and Buffalo divisions can be greatly improved in these respects, and the cost of transportation over them much reduced.

TERMINAL FACILITIES.

The terminal arrangements must be sufficient to receive and deliver passengers and freight with the greatest celerity and safety. To secure these results there is absolutely needed at the Jersey City terminus a re-arrangement of the tracks in the yard, and additional provision for the speedy unloading of grain cars, with convenient warehouses to store freight that may await shipment or coastwise delivery. Plans for accomplishing these objects are being carefully considered by improving the Long Dock property on the south side of Pavonia avenue, in the construction of one or more grain elevators, the necessary piers, dredging the slips and erecting warehouses to accommodate the traffic. It is confidently believed that the presentation to shippers of the use of such facilities will attract to the railways of your company an increased through and local traffic. It will be meeting the great want of the harbor of the city of New York, and one in which its rivals have the advantage, viz., cheap transfer of grain and other freight for shipment. At Buffalo, a grain elevator of moderate capacity, and at a cost not exceeding $300,000, is a necessity for the economical handling of grain at that port.

A new passenger and local freight station are needed in that city, and some additional ground will be required for the laying of side tracks.

A suitable passenger station at the Jersey City terminus cannot be much longer delayed.

Report of the Western Railroad Association for 1878.

Mr. Robert Harris, who, for many years, has filled the office of President of the Association, by the acceptance, in October last, of the office of General Manager of the New York, Lake Erie & Western Railroad, withdrew from active participation in the work of the Executive Committee, and from the end of the current year will cease to be a member of this Association. The fidelity and success with which he has so long served the Association as its chief executive officer deserves very grateful mention. During his administration the membership of the Association has increased from 16 to over 80 companies; its work has increased at least thirty fold, and notwithstanding that fact the annual assessment for expenses has been very largely reduced. Your committee make this acknowledgement the more gratefully, for that Mr. Harris has gratuitously performed these services at the expense of considerable time and labor.

The year 1878 has been for the Association one of unusual activity and success, as will partially appear from the following report, which in this respect must, from the nature of the case, be imperfect, because neither the amount of work done nor the results accomplished can be fully shown by statements of facts or figures.

USE OF NEW DEVICES.

The greatest increase and activity has been in the requests for opinions as to the patent relations of devices desired to be used. During the year 138 new subjects matter have been investigated against 90 last year, and 315 opinions and advices written against 258 for last year.

Previous annual reports have shown how it is unsafe to use the simplest device, whether invented by an employé or presented by another, and even though it is presented by a patentee who also presents a patent showing and describing every element of the device, without an examination and opinion as to its patent relations from one specially versed in patent law and in the art to which the device belongs. This work is fast becoming, if it has not already become, the most important part of the business of the Association. The facts that there are now more than 165,000 American patents alive, thousands and thousands of which relate to devices and processes used by railroad companies (there are over 1,700 patents upon couplers for freight cars now alive), and that any one device or process may infringe one, two, three and even more patents, alone justify our again calling special attention to and earnestly insisting upon the more general observance of those rules of the Association, providing "that no new device or process, whether invented on the road or presented by a patentee, shall be even experimented with without first ascertaining from the Association and arranging for the liability to arise from its use." During the last five years, so far as we can learn, out of the hundreds of cases in which the Association has recommended the use of any process or device only upon settlement under this, that or the other patent or patents, in only one instance has this recommendation been disregarded, and in no instance thus far has any claim for such use been subsequently presented. We call special attention to this matter, not only to show its importance, but also because it seems to us that the practice of so referring each and every device or process before using it is not yet as general among the members as it should be. We therefore recommend that every manager who has not already done so, shall immediately issue peremptory orders to all the departments of his road that the above rule shall hereafter be strictly complied with.

The following list comprises some of the subject matter in which patents have been examined and opinions given during 1878:

Axle boxes, ash pans, bearings, quadrant; bearings, journal, hard and soft; brakes, car and locomotive; brake shoes, car roofs, car stoves, car chairs, reclining; car, sleeping; car axles, car trucks, car seals, car records, car, changing gauge of; combined fence and gate, checks, baggage and stop-over; coal chutes, crown bars, couplers, cylinder cocks, crossings, cylinders, air-brake; draw bars, fire extinguishers, fence, wire; furnaces, flue joints, grain doors, head lamps,

king bolts, locomotive centre pins, mortising machines, nut locks, oils, mineral; pins in buffers, wooden; pumps, punches, hand; platforms, car and station; pipes, rotating drop; reaming tools, railway gates, signals, train; signals, electric; signals, head lamp; smoke stacks, smoke consumers, switch stands, switches, seal bolts, speed recorders, telephones, track drills, track gauges, train reflectors, valves, ventilators, water connections, tanks, etc.

SETTLEMENTS.

Another rule of the Association is "that no settlements for any patent claim shall be made without first consulting the officers of the Association, and never, unless in extreme cases, contrary to their advice." This rule is based upon two special considerations: *First.* It is evident that the officers of the Association, by reason of special information and experience, possess in most cases advantages in making any such settlement which the individual company does not have. *Second.* As a rule it is desirable that the releases and licenses incident to such settlements, should be drawn by the General Counsel of the Association, that they may be in proper form to afford full protection, and that the proper signatures may be joined thereto. Tens of thousands of dollars have been paid since the reorganization of the Association to perfect licenses heretofore taken because the originals were not properly drawn. In December last a settlement of a suit was effected for a company which had at the time the suit was commenced *eight* licenses under the patent sued upon. These were found collectively to be insufficient, and an additional amount had to be paid to properly dispose of the claim and of the suit.

LITIGATION.

Eighty-five suits have been in charge of the Association during the year.

In addition to a large number of patent claims, *twenty-nine* of these suits have been satisfactorily disposed of during the past year.

THE TANNER BRAKE.

The most important event in the history of the Association for the past year is the decision of the Supreme Court in the case of Sayles against the Chicago & Northwestern Railway Co. It is true that the only point formally decided was that the Stevens brake, that used by the defendant, is not an infringement of the Tanner patent; but the same line of reasoning must also, it is believed, lead to the same conclusion in regard to the Hodge brake. Furthermore, the Court, in giving their opinion, took occasion to express their views upon another point in the case, and one directly affecting the validity of the patent and they must have done this so clearly and unmistakably that, in the opinion of our Counsel, in which we fully concur, the Court will, if the Tanner patent ever comes before them again, pronounce it absolutely void. The question as to the ownership of the Tanner extension has now become, therefore, of very slight importance. The opposing claimants, however, are still continuing to litigate the matter, and will probably obtain a decision upon it during the present winter, in the Supreme Court. They will also continue to press their claims under both the original term and the extension, against roads using either the Hodge brake or the Tanner, but we trust that none will be found to listen to their demands or give them any encouragement. It is no longer a case for compromise or settlement, except, possibly, in some few cases and for very small amounts.

THE SWAGE-BLOCK CASES.

These cases remain in very much the same condition that they were in a year ago. In some of these cases, as also in all those under the Hodge brake patent, the question has been presented, whether the state statutes of limitations apply to suits for the infringement of a patent. Justice Harlan and Judge Drummond have both very decidedly expressed the opinion that the state statutes do apply, but at the same time felt themselves compelled by what seemed to them the weight of authority to rule the other way. We believe that their "opinion" was right, and that there is no such "weight of authority" against them; but this question cannot be considered free from doubt till finally settled by the Supreme Court.

VENDOR'S LIABILITY FOR ROYALTIES PAID BY VENDEE.

Pursuant to the last annual report we have made several propositions to Messrs. Burnham, Parry, Williams & Co., of the Baldwin Locomotive Works, to amicably test in the courts the question whether a builder of a locomotive who, without any advice to, or any instructions from, his patron, puts into a locomotive a patented device, should protect the patron in the use of that device and reimburse him for royalties paid therefor; but they decline to test the question, and continue to decline to reimburse the members of the Association—as the other locomotive builders have done either in whole or in part—for royalties heretofore paid upon such devices. We can now see no way of testing that question, except at a disadvantage, without some coöperation of the builder, but are expecting a case to arise in which we may be able fairly to adjudicate the equities of this matter.

SLEEPING-CAR PATENTS.

The case of George M. Pullman and the Palace Car Co. against the Barney & Smith Manufacturing Co., commenced in 1876 at Cincinnati, was for the infringment of some of the sleeping-car patents owned by the Pullman company, by the manufacture of four cars for the Chicago, Milwaukee & St. Paul Railway Co., and six cars for the Wagner Sleeping Car Co. Arrangements were made with the Wagner Sleeping Car Co. for the joint defense of this suit, in which it was expected that the validity and scope of the apparently more important sleeping-car patents would be determined, but the plaintiffs filed a stipulation that no further proceedings in the case need be had until notice given, and the case has not, therefore, progressed beyond the pleadings and a part of the *prima facie* case of the plaintiffs.

PAGE TELEGRAPH PATENT.

The Western Union Telegraph Co., owners of this patent, on account of controversies pending with some of the members, have refused to grant any full protection against this patent to all the members of the Association. That company, however, is willing, as to all members with whom either it or the Atlantic & Pacific Co. has contracts, to so reform those contracts, if necessary, as to fully protect such members against any damages, profits or savings for the time which those contracts cover.

COSTS.

We have been able, during the year, to dismiss several suits upon paying the costs therein. Whereupon the question arose whether such costs, which varied in amounts from $1.15 to $46, should be paid by the Association or by the company defendant. We have paid the costs in cases where they amounted to little, and have in other cases collected the same from the company specially interested. The only rule the Association has, beyond the general rule, that it pays the cost of conducting the litigation in its charge, is, that in the case of final judgments or decrees against members, they shall pay all unpaid taxable costs which form a part of the judgment or decree. We submit this question for the action of the annual meeting.

A MINIMUM ASSESSMENT OF $100 PER MEMBER.

At the last annual meeting the question of amending the constitution so that no member excepting proprietary lines of other members shall be assessed at a less rate than $100 per annum, was referred to this committee with instructions to take the votes of all the members of the Association upon the proposition, and record that vote as a part of the records of that meeting. That vote was taken and resulted: yeas, 63; nays, 8; not voting, 12. Of the 21 members whose assessment would be increased by the change, there were: yeas, 8; nays, 8; not voting, 5.

For the reasons that the present system of assessment is satisfactory to all the members; that some few of them so seriously object to the proposed change that they would withdraw if it were made; that we prefer to conduct the suits brought under patents against railroad companies in order to properly protect interests in other suits pending, or to be commenced, even though the assessment of the company sued shall fall far short of the expenses of conducting the litigation; that there would be some practical difficulties in applying the proposed rule, and that the change could not at the best add more than $1,200 to our revenue, we have not recorded this vote in the records of the last annual meeting.

INCREASE IN NUMBER OF MEMBERS OF THE EXECUTIVE COMMITTEE.

By Article III. of the present by-laws, it is provided that the board of directors may appoint "an Executive Committee of three members from their own body, to which they may delegate power to do any and all acts which they themselves are authorized to do, except such acts as, by law or the by-laws, must be done by the board itself."

This number would be sufficient if all the members of the committee could always be got together; but as this is often impossible, it has been suggested that it would be well to increase the number of the committee. We concur in this suggestion, and recommend that the said Article III. of the by-laws, be amended by changing the word "three" in the ninth line thereof to "five."

Our participation in the movement to secure from Congress amendments to the present patent law, has called forth from many quarters unjust comments as to the purposes and work of this association, and as to the general policy of all railroad officials toward patents and the patent law, which has been caused in part by a lack of information. It is unnecessary that we say anything further to the members concerning the purposes and work of the Association, but we submit the following suggestions concerning the general

PRINCIPLES OF OUR RELATIONS TO PATENTS AND INVENTIONS.

We believe that the gradual and continuous reduction in the rates of fare and freight which has taken place would have been impossible without the economy of the labor-saving and operative devices which invention has furnished. It is evident that while "railroading" is being gradually more and more reduced to an exact though unwritten science, and while its masters are members of a profession that is growing in wisdom and importance, still, that further reduction in fares and freights, which the logic of events will make necessary in the future, is dependent largely upon further improvements which the inventive genius shall furnish. It is seriously doubted by some whether invention has not been stimulated too much in some of the arts—as that of agricultural implements. It is, however, difficult to see how the inventor can in any way do too much in the matter of reducing the cost or increasing the facilities of transportation. If, then, it is in any sense good policy for the government, by arbitrary means and the offering of special inducements, to stimulate invention, so much more is it wisdom for transportation companies to use every proper means toward the same result.

Again, the right of the inventor to his invention, though a statutory right, is also a property right, and entitled to respect as such. The spirit which would knowingly deprive an honest, original inventor, or his assignee, of his right or of the reward due for its use by another, simply because it is a patent right, is the same as the spirit which plunders a railroad corporation simply because it is a railroad corporation.

We have been charged with the sole purpose of sustaining and defending railroad companies in the wrongful appropriation of patent property without paying therefor, except when forced in occasional instances to do so by "plucky inventors" to the extent that public officials and others have seemed to be affected thereby. The Association could not live upon any such basis. Such purposes have no place in its councils, and should not have in the minds of its members. On the contrary, our most earnest endeavor is to ascertain and settle for such liability as far as possible in advance, and our practice, when claims are presented for uses not paid for, is to refuse no man's claims without giving him our reasons for the refusal; and thus far in five years in no instance of such refusal has the claim been thereafter insisted upon. Not only because it is eminently good policy to do so, but because it is right, and because the permanence and efficiency of the Association depend upon its being conducted in obedience to law, and in conformity with the principles of equity and justice, we believe it is the intention of the members, as it is the purpose of their present officers, first, to encourage invention in railroad appliances, and second, to fully respect and fairly accede to the just claims of the first inventors of valuable improvements, and the assignees thereof, giving, however, as far as possible, to the "sharks" who present frivolous and invalid claims their just deserts.

It has been with the idea of first perfecting and then aiding to preserve the patent system that we have earnestly followed the directions of the last annual meeting in urging upon Congress the enactment of the 23 amendments to the law embodied in the bill (Senate bill 300, House bill 1,612) which, at the date of this writing, is being discussed by the Senate.

While we would deprecate any movement to repeal or to seriously impair the integrity of the patent system, we recommend that proper and earnest efforts be continued to secure such amendments to the law as will prevent the recurrence of many of the excessive evils from which we have suffered so unjustly in the past.

Pursuant to the order of the last annual meeting, we have examined the Treasurer's accounts and vouchers for 1877, and we have approved the same.

A. L. OSBORN,
B. C. COOK,
of the Executive Committee.

Locomotive Building in 1878.

Thomas Hobson reviews this industry in the *Iron Age* as follows:

"Business during the year has shown quite an improvement; actual statistics indicate an increase of over 60 per cent. as compared with the preceding year, the output at the Baldwin Works being 185 locomotives in 1877, against something more than 300 during 1878. Forty of these, however, on Russian account, may be regarded as exceptional. Another portion of the increase is due to orders from the elevated railways, and to some extent, also, to the introduction of street motors. Making due allowance for these, however, a clear gain of 35 to 40 per cent. has been established in ordinary business as compared with the previous year, while a large portion of the increase has been obtained during the last six months. The Baldwin Works, in course of the current year, have received orders and made shipments of locomotives to Brazil, Peru, Cuba, Nicaragua, Russia, Norway, Italy, Australia and New Zealand, with results that seem to indicate the establishment of a permanent trade with all these countries. Within the past week an order has been received from Brazil for six narrow-gauge locomotives, and the outlook generally is regarded as fairly encouraging. Prices have had a shrinkage of fully 50 per cent. during the past five years. Locomotives which cost $10,000 in 1873 can now be bought for $5,000. Cost of production has decrea ed largely, but not in proportion to selling prices. The company have just shipped to the Far West what is probably the most powerful locomotive ever built, its capacity being estimated at 2,500 tons on a level. For the time being street motors seem to have lost their popularity, although we notice in the Baldwin Works one being built for a street railway in Dunedin, New Zealand, and another for Brooklyn, New York. The low price of horses and horse feed, as well as an indisposition during these stringent times to make any changes involving outlay, is the chief cause of apathy in regard to street motors, but they are a demonstrated success, and will no doubt eventually be brought into general use. Average number of men employed, upward of 2,500. The firm have just received by cable an order for nine of the largest sized locomotives, showing the opening of business in a field of great importance."

This review seems to be limited to the business in Philadelphia—that is, to the Baldwin Works.

RAILROAD LAW.

Liability of Directors—Fradulent Contract.

The Kansas Supreme Court has just decided the case of Ryan and others against the Leavenworth, Atchison & Northwestern Co. Its decision may be briefly summed up as follows:

1. Directors are trustees for the stockholders and are required to manage their trust with good faith and not to promote their personal interests.

2. Where an association is formed for the purpose of acquiring control of a company and securing the contract for the building of its road, such association including directors and officers of the company itself, the contract, if obtained, may be held illegal and void, and the company may call its officers to account for their willful abuse of their trust, or for any misapplication of the funds of the corporation or for any profits realized under the fraudulent contract. Other persons who knowingly joined in the contract are also liable.

3. In the absence of any proof to the contrary, a purchase of stock in a connecting road will be presumed to be lawful and necessary for the purposes of a company.

4. If a corporation refuses to call to account officers who are abusing their trust, or if it is under the control of the very parties who are to be prosecuted, making it probable that any such suit will not be brought in good faith, the stockholders, or a part of them, may bring and maintain an action to make unfaithful officers liable.

5. Where stock in a connecting road has been misapplied or wrongfully conveyed, stockholders in the company lawfully owning such stock may bring suit to compel a retransfer of said stock, and may make all the persons concerned parties to the suit.

6. As incident to shares of stock in a corporation, is the right to receive all the dividends by the owner and holder of the same after the purchase thereof; that is, their proportional share of all profits not divided when such purchase is completed, and it is immaterial at what times or from what sources these profits have been earned.

7. The claims of stockholders in a corporation are subordinate to the claims of creditors, and the stockholders are not entitled to any divisions of the profits and moneys of a corporation until all its debts are paid.

8. The statute exempts an innocent party from limitation of time until a discovery of fraud, and it is held that knowledge, on the part of the guilty officers and agents of a corporation of the fraudulent acts and conduct of themselves and guilty associates, is no notice to the corporation or its stockholders.

9. When a petition is withdrawn, by consent of the court and without objection by defendants, and an amended petition filed, it relates back to the first beginning of the action and must be held as of that date.

Liability of Carrier over Connecting Lines.

The suit of Myrick against the Michigan Central Company was brought in the United States Circuit Court in Chicago to recover for improper delivery of 400 head of cattle. The cattle were shipped from Chicago to Philadelphia on a through bill of lading marked "Consigned to Paris Myrick. Notify J. & W. Blaker for transportation." They arrived in Philadelphia by the North Pennsylvania Railroad, which turned them over, according to custom, to the Philadelphia Drove-Yards Co., which in turn delivered them to J. & W. Blaker without the surrender of the bills of lading. On the trial Judge Blodgett instructed the jury that the bill of lading was a through contract, whereby the Michigan Central agreed to transport the cattle from Chicago to Philadelphia, and to deliver them to Paris Myrick, notifying J. & W. Blaker of their arrival. The Michigan Central was bound to notify each of the carriers beyond its own terminus of the precise terms of the contract, and each of those carriers was, for the purpose of executing the contract, its agent, and as such bound to carry out its terms as if the Michigan Central road had extended the whole distance to Philadelphia. No plea of usage or custom, even on previous deliveries for the same party, would bind the assignee of the receipt or bill of lading, unless he had actual notice of the usage by which the terms were changed.

Under these instructions the jury found for the plaintiff, fixing the damages at $26,451. Counsel for the company gave notice of motion for a new trial.

Limiting Damages in Patent Suits.

A strong move is being made in Congress to amend the patent law, so as to provide that no recovery of damages or costs shall be had against the defendant in any suit for infringement, if it shall appear that he purchased the patented article for his own private use, from a manufacturer or dealer engaged in the open sale of the same, the defendant being without knowledge or actual notice of the existence of the patent. This amendment, if adopted, would destroy, in a very great degree, the protection now given to inventors by the patent laws. If the patentee of an article was obliged to resort for damages in case of infringement to the manufacturer, he would in most cases be unable to obtain redress, for those who manufacture and sell patented articles without right to do so are, as a rule, irresponsible. To require the purchaser of a new contrivance for facilitating labor to examine whether the same is patented or not is imposing but a slight burden, and in case the same is an infringement, and is used, there is not one instance in a thousand where the patentee demands more than a trifling royalty.—*Albany Law Journal.*

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EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

TRAIN ACCIDENTS IN 1878.

This review of the train accidents of the calendar year is the sixth that we have published. Our record being the only one made for the whole United States, and the yearly review being examined and commented upon by many who are not familiar with the monthly records and have not read or do not remember the explanations of it which we have frequently published, it seems advisable to introduce the review every year by a restatement, lest it be taken for something different from what it actually is.

In the first place, then, this is a record of train accidents only—accidents *to* trains, not accidents caused by trains, such as the running over of men and animals on the track without injury to the train. There are several times as many people killed on the road as are killed on the trains, but of all these—most of them trespassers on the track, but a great many employés engaged in their duties—are left out of the account in our record, the sufficient reason for which is that it is impossible to collect anything like complete information of these casualties; though if it were, they would need to be reported apart from "train accidents," and studied largely for a different purpose.

In the next place, as to the sources and completeness of our information. The source is chiefly the newspapers, which, from all parts of the country, are examined carefully for this purpose, though we have some help in this particular from correspondents. We notice, however, that our correspondents do not often inform us of accidents which we do not also hear of through the newspapers. Their information is often valuable as pointing out circumstances which the newspapers neglect, however.

Now, there is a very large number of accidents which never get into the newspapers. Most of these they never hear of, and very likely they would make no mention of them if they did hear of them. But these unrecorded accidents are in the great majority of cases such as do little damage—slight derailments of passenger trains which hurt no one and cause little delay, or accidents to freight trains which do not cause any considerable damage to rolling stock, though they may delay freight trains considerably. Accidents which kill or seriously injure any one on the train are pretty sure to be reported, and of these accidents our record is probably pretty complete.

Whether complete or not, however, its value is about the same to railroad men. What they need to know is not so much the exact number of collisions and derailments and damage done thereby, as the *proportion* of accidents, especially of fatal accidents, due to each cause. Now an incomplete record, made as ours is, is likely to show almost exactly the proportion of serious accidents due to each cause. Accidents from one cause are not more likely than those from another to escape record.

The number of accidents in any year is very greatly affected by the severity of the winter weather in that year. In 1873, when there was a great deal of snow, one-third of the accidents were in the first three months of the year; in 1875, also, with a severe winter, nearly two-fifths; in 1877, which had a snowy January, one-sixth of the accidents were in that month. Last year, when the winter was very mild, the number of accidents in the winter months was just about at the average rate for the whole year.

Any one who remembers the weather or has access to a record of it can trace below its effect very plainly in the record of accidents for each month of the past six years. We might almost say that the number of accidents rises with the thermometer; but snow has more to do with it than cold, and the severe cold and deep snow do not always come at the same time, though, taking the country over, they usually come the same winter.

Number of Train Accidents Each Month for Six Years.

	1873.	1874.	1875.	1876.	1877.	1878.
January	178	108	131	60	147	75
February	133	90	211	91	56	67
March	112	88	122	109	58	49
April	101	59	60	56	69	46
May	79	89	54	64	46	50
June	10	83	61	52	49	56
July	90	64	73	79	53	54
August	150	73	114	78	98	75
September	106	89	116	108	84	76
October	88	81	88	103	82	61
November	76	82	87	96	84	68
December	80	74	84	88	66	63
Total	1,283	980	1,201	982	891	740

Other meteorological phenomena have considerable effect on accidents. Much rain, and especially sudden floods, generally result in many accidents. And both snow and floods, which block the track or make the road soft and dangerous, cause many kinds of accidents. Aside from those directly occasioned by the condition of the road are others due to the irregularities of trains behind time and out of place. So far as snow is concerned, 1878 was one of the most favorable on record, what little damage there was occurring chiefly in December. There was a great deal of damage by washouts, however, and our record shows nearly twice as many accidents due directly to them as in 1877.

In other particulars, there was little exceptional in the year. Passenger traffic was generally light, probably the lightest for many years, but it is doubtful if there was any diminution in passenger-train service. Of course the addition of new roads adds something to chances of accident, but the new roads have generally a thin traffic, and their addition is not likely to have much effect. There has been for years a quite notable progress in the condition of tracks and road-beds, not in the substitution of steel for iron alone, but in the care of track and road-bed and everything belonging to them. This should have an effect, especially in lessening derailments. Probably progress never was more rapid, at least in substituting steel for iron, than in 1878, when some roads which had been too poor to maintain their tracks had more money than usual to spend.

The number of train accidents and of persons killed and injured by them, reported in our record for each of the past six years, has been:

	1873.	1874.	1875.	1873.	1877.	1878.
Accidents	1,283	980	1,201	982	891	740
Killed	276	204	234	328	214	204
Injured	1,172	778	1,107	1,097	1,047	756

The number of accidents reported last year thus is the smallest for the six years—17 per cent. less than in 1877, about 25 per cent. less than in 1876 and 42 per cent. less than in 1873. As our record is not at all complete as to the number of accidents, and the number of killed and injured is much more nearly correct, we will compare these. Here we find 1878 the most favorable of the six years, and next to it is 1874. Compared with 1877 the record for 1878 shows 5 per cent. fewer killed, and about 28 per cent. fewer injured by train accidents.

The year 1878, however, had more serious accidents, we believe, than any in 1877, though none so fatal as the Ashtabula accident just at the close of 1876. The most serious accidents of the year were:

	Killed.	Injured.
Jan. 15. Tariffville, Conn., Conn. W. R. R., fall of bridge	13	46
Aug. 7. Mingo Junction, O., P. C. & St. L. Ry., butting collision	18	40
Oct. 8. Wollaston, Mass., Old Colony R. R., misplaced switch	21	126
Three accidents	52	212

Thus to these three accidents are due one-fourth of all the killed and 28 per cent. of all the injured by all the 740 train accidents of the year.

The classification of the accidents of each of the past five years, according to their nature or causes gives the following results:

COLLISIONS:	1878.	1877.	1876.	1875.	1874.	1873.
Rear	142	150	159	141	131	187
Butting	70	93	94	104	87	102
Crossing	7	13	15	18	19	31
Unknown	1	..	11	15	23	72
DERAILMENTS:						
Unexplained	175	177	185	222	218	315
Broken rail	17	46	50	107	42	111
Misplaced switch	48	70	89	81	67	72
Cattle on track	30	43	46	51	45	54
Wash-out	36	17	40	44	10	30
Loose or spread rails	29	41	43	40	16	13
Broken axle	18	43	38	39	20	21
Accidental obstruction	26	22	36	37	51	44
Snow or ice on track	13	25	16	26	13	9
Broken wheel	5	12	22	33	20	26
Broken bridge or trestle	21	21	20	26	33	19
Malicious obstruction	15	11	11	21	22	11
Broken truck	13	8	10	15	8	7
Broken or defective switch	1	6	4	15	12	10
Land-slide	4	11	9	11	..	..
Broken or defective joint	2	2	1	10	5	3
Broken or defective frog	2	2	3	8	8	4
Wind	1	2	2	7	..	..
Rail removed or displaced	5	7	7	8	7	16
Broken parallel or connecting rod	..	..	..	5	..	..
In making flying switch	..	..	2	4	..	..
Failure of coupling or draw-bar	4	1	1	3	7	8
Broken car	1	1	2	3	..	..
Runaway engine	2	1	..	3	1	6
Running through siding	6	3	6	2	3	3
Loose wheel	..	1	3	2	4	2
Open draw-bridge	4	4	3	2	6	4
Bad track	..	..	4	2	13	7
Fall of brake or brake beam	..	..	..	..	4	9
Careless stopping or starting	..	..	..	..	3	..
Overloading car	..	..	1	..	3	..
Bad switching	..	..	..	..	2	..
Running over man	..	..	..	..	..	2
Float over track	..	..	..	..	..	2
Others (one each)	3	4	1	3	11	7
ACCIDENTS WITHOUT COLLISION OR DERAILMENT:						
Boiler and cylinder explosions	12	15	22	20	13	19
Broken parallel or connecting-rod	11	13	7	14	8	11
Broken axle	..	1	2	13	..	..
Cars burned while running	13	7	11	10	16	2
Broken tire	..	1	..	9	..	..
Broken crank-pin	..	1	..	2	..	..
Flue collapsed	..	3	..	1	4	..
Other breakages of rolling stock	..	2	4	5	10	10
Steam-chest explosion	..	..	..	..	2	..
Fuse-plug blown out	..	..	..	..	2	..
Failure of bridge or trestle	..	..	..	..	2	..
Mass falling on running train	..	1	1	..	2	2
Accidental obstruction	..	..	..	..	..	11
Malicious obstruction	1	..	1	..	..	3
Unknown	..	..	..	..	2	9
Totals	740	891	982	1,201	1,180	1,283

RECAPITULATION.

	1878.	1877.	1876.	1875.	1874.	1873.
Collisions	220	268	279	278	260	392
Derailments	481	581	655	840	654	815
Other accidents	39	42	48	83	66	76
Totals	740	891	982	1,201	1,180	1,283
Average number per day	2.03	2.44	2.69	3.29	2.68	3.51

Information as to the cause of an accident is often indefinite, and many of those which we report are secondary causes. We give them as definitely as our information permits; and there are a good many lessons that may be drawn from this list. Breakages of rails vary with the severity of the weather and the condition of the roads at that time, wash-outs and land-slides with the storms of rain, and there are some others which depend more or less upon the weather, but most of them cannot be charged upon any such scapegoat.

Of the derailments for which causes are assigned, the percentage due to each of the chief causes was as follows in the several years:

	1878.	1877.	1876.	1875.	1874.	1873.
Broken rail	2.3	11.4	10.6	17.3	9.9	22.2
Misplaced switch	6.5	17.3	18.9	13.1	1.4	14.4
Cattle on track	4.1	10.6	9.7	8.2	10.3	10.8
Wash-out	4.9	4.2	8.5	7.1	2.3	6.0
Loose or spread rails	3.9	10.1	9.2	6.5	3.7	2.6
Broken axle	2.4	10.7	8.1	6.3	4.6	4.2
Accidental obstruction	3.5	5.4	7.7	6.0	11.7	8.8
Broken wheel	0.2	3.0	4.7	5.3	4.6	5.2
Broken bridge	2.8	2.4	2.0	2.2	3.4	1.5

The reduction in the number of accidents as compared with 1877, is about the same in collisions as in derailments. In the latter, the most notable change is the great decrease in those due to broken rails. These vary very much with the coldness of the winters, but 1877 as well as 1878 had a mild winter, and the decrease from 46 to 17 indicates that quality of rails and condition of road-bed has had something to do with it; the change since the cold winter of 1875, when we recorded 107 derailments by broken rails, or from that of 1873, when there were 111, is certainly remarkable. It is to be hoped, and there are reasons for believing,

that much of this improvement has been due to permanent causes. The cold weather which we have been having this winter will enable us to judge better of this. A few very cold days in December seem not to have had the effect that was almost sure to follow a few years ago, as we had but one accident from a broken rail to report that month. But heretofore, as we have noted from year to year, most of the accidents from this cause have been in the winter months, and they have been especially frequent in cold winters, as appears below:

Accidents from Broken Rails in the First and Third Quarters of the Calendar Year, for Six Years.

	1873.	1874.	1875.	1876.	1877.	1878.	Total.
First quarter.....	65	20	90	26	26	7	234
Third quarter ...	5	5	3	5	7	2	27

That is, in the quarter including the months of January, February and March, there have been in the different years from three to thirty times as many accidents from broken rails as in the quarter including July, August and September; and in the aggregate for the six years there have been about nine times as many in the cold as in the hot quarter. Breakages of wheels seem to have followed pretty closely the breakages of rails, that is, there have been more in cold than in mild years; but this is not true of breakages of axles. There were more of these in the mild year 1877 than in the cold one 1875. Generally, it would appear that the breakages of rails in cold weather are due chiefly to an inflexible, uneven road-bed, rather than to (if at all to) any change in the tenacity of the rail.

The small and decreasing number of accidents from broken wheels recently (5 in 1878, 12 in 1877, 22 in 1876 and 33 in 1875) may, we think, be fairly attributed, in large part at least, to the greater attention paid to the subject of wheels, and the more careful records made of their service. It may be said, too, that in this case the railroads are saving money by the measures by which they are getting the greater safety. As probably 99 per cent. of all the wheels run are of cast iron, the experience we have had with them would seem to be pretty good evidence of the safety of this material for the purpose. A broken wheel, however, does not usually cause derailment of American rolling stock, resting on four-wheeled trucks.

The number of accidents due to failure of bridges is as great as in 1877 and greater than in 1876, in spite of the smaller aggregate number of accidents, and in spite, too, of the recent terrible warnings—the Ashtabula accident at the close of 1876 and the Tariffville accident at the beginning of 1878—which ought to have and doubtless did turn special attention to these structures. Most of the accidents are to wooden structures, and many of them are due to the undermining of their foundations by floods; but the number is disgracefully large for all that.

A more general classification of the causes of derailments gives the following:

	1873.	1874.	1875.	1876.	1877.	1878.
Defects or failures in permanent way.....	200	146	231	165	137	72
Defects or failures in rolling stock.....	73	61	101	76	67	42
Negligence or malice..	96	107	114	119	97	82
Unforeseen obstructions	111	105	142	107	113	110

This brings out in a striking way the decrease in accidents caused by bad condition of road, or bad materials in it, and adds to the evidence that there has been a considerable improvement in American roads of late. In 1875 42 per cent. of the explained derailments were charged to the permanent way, in 1876 35 per cent., in 1877 33 per cent., and in 1878 only 23½ per cent. The decrease in the derailments charged to bad rolling stock has been nearly as rapid. In those due to negligence and malice the change is not such as to indicate any great improvement in the skill, watchfulness and discipline of employés, or in the morals of the world at large.

We have not hitherto made any record of the causes of collisions, or of the number of casualties due to accidents of different kinds. For 1878 we have noted some of these facts which are not without interest and significance.

The killed and injured by these two general classes of accidents were:

	Killed.	Injured.
By collisions	59	230
By derailments.....	135	523

This leaves 10 killed and 3 injured due to the 39 accidents, such as the bursting of boilers, which were neither collisions nor derailments.

The collisions were:

Of two passenger trains.....	24
Of a passenger and a freight train.....	65
Of two freight trains.....	131

And the principal causes reported were:

Train breaking in two.....	28
Misplaced switch.....	19
Cars blown from side to main track.....	6

The first cause goes to increase the number of accidents due to failures of rolling stock (couplings), but by far the largest number of collisions is due to negligence in some form—sometimes of men at the stations who misplace switches or fail to secure standing cars, as above, but more frequently of the train-men themselves, who are the greatest and in most cases the only sufferers by these accidents.

The derailments were:

Of passenger trains.....	172
Of freight trains.....	301

In the collisions, of course, there are two trains involved in each accident, and 440 in the 230 collisions of 1878, 113 of which were passenger trains; and of all the trains involved in the recorded collisions and derailments 285 were passenger and 636 freight. It must not be inferred, however, that the whole number of accidents is divided in that proportion, or in anything like it, between passenger and freight trains. Freight-train accidents which hurt no one are just the ones that are least likely to come to light, and that generally, even, no doubt, escape our record; while the passenger-train accident must be of little consequence that does not get into the newspapers.

We repeat that our record indicates considerable progress in limiting the risk of accidents to trains, though it may well be that 1878 will prove an exceptionally favorable year. If the three most fatal accidents of the year had been eliminated (two due to negligence of train-men), the record would have been not only comparatively but positively favorable. What has been done heretofore seems to have been mostly in improving the road and rolling stock. What most needs doing now is the improvement of the men who work them—officers and employés—though there is still plenty of room for progress in the tools with which they work.

IRON CARS.

On another page an engraving and description are given of an iron car, which will be of interest to many of our readers at the present time. The construction of iron freight cars has been attempted a good many times, but until very recently, it must be confessed, no very high order of ability has been brought to bear on the question. Car-builders as a class are men whose training has been almost exclusively in wood work, and most of them are entirely ignorant of the theory of strains, and also to a very great extent of the details of iron construction, especially of such as must be employed when iron "shapes," such as angle and T iron, I beams and channel bars are used. Without special skill in this kind of construction it may be safe to say that the design of an efficient and economical iron car is impossible.

On the other hand, several engineers with experience in iron bridge-building have given some attention to the problem. They are very apt to regard an iron car as a "bridge on wheels." If this were the problem, it would be a very simple one; but it is in the fact that an iron car must be regarded as a structure which is subject to and must resist not only statical strains, but also concussions, collisions, shocks and bumps of all kinds, and is subjected to every variety of tensile, compression, torsional, transverse, and shearing strains of all known descriptions. The science and art of engineering have been classified into statical and dynamical engineering. The problem of car construction involves the difficulties of both.

At the Master Car-Builders' meeting, held in November, Mr. A. F. Hill stated the problem as follows:*

"Considering the car as a bridge, and remembering that as long, or within reasonable limits, as I am not obstructed in my choice of depth of truss, the more I increase my depth of truss the more material I can save, there is no reason why I cannot make the side of the car, instead of trussing under the frame, one truss of 6 ft. 5 in. depth. Now I have increased my depth of truss seven times very nearly by it, and of course I shall abandon at once every stick of timber there is in that frame and change it into iron. I should suggest to make the outside sills of steel the bottom chord of the truss, and this bottom chord has to carry the floor system and the load; that is, I have got a bridge where the load is on the lower chord. I have got the bridge itself on a pivot with 19 ft. 4 in. in the clear. The top chord I propose to utilize in the same way as is the plate in the wooden car. Intermediate timbers I propose to do away with altogether. I have got here a distance of 19 ft. 4 in. in the clear, or, in other words, from abutment to abutment. I take the height of my car to be 7 ft. In other words, I utilize from bottom chord to top chord. I ought to make this 6 ft 5 in., as the height of truss from centre to centre of chord. This truss is divided into three square panels, of 6 ft. 5 in. each; and here is my first portion of the truss. Now I have to take care of the end parts. The end parts may be regarded in the light of a beam supported at one end and uniformly loaded; or the whole truss may be considered in the light of a continuous girder with the intermediate supports 4 ft. 10 in. from the end. I have now to provide here for my door posts. I have also to provide against a strain here on the end and for the counterbraces or for the greatest stability of my end post by a third brace. Here is the side frame of the car. The centre panel is without any bracing, so as to leave it free for the door opening. The whole truss or side of the car I should propose to make a riveted truss, using channel iron for top and bottom chords, and flat bars, I beams and angles for centres. Let this represent the horizontal projection of the lower chords. For the end sills I propose again to use channel bars and to face those channel bars with timber, this timber to be bolted on and through on to the chords. There are no intermediate floor beams; there are only two centre floor beams. Now, in regard to the floor system, I propose to use I beams, taking the inside of the length of the car to be 28 ft. in the clear. I propose to use, as in my floor system, 3-in. I beams—the very lightest kind of I beams—and on the top of these I beams with the outside channels 7½ in. high, I propose to lay down longitudinal floor stringers, yellow pine, 2 × 5 in., and exactly one foot apart from inside to inside. Eight of these floor beams run now from end to end, supported by the I beams. Underneath and on these can be spiked the ordinary 1¼-in. floor, which is used in the box car."

*For full report see *Railroad Gazette* of Nov. 29 of last year.

Now if this were the whole of the problem, it would be much simpler than in reality it is. If any bridge-builder were called upon to build a car to carry its load while standing still, he could do it without any difficulty; but every experienced car-builder knows that the reason why cars wear out is that the joints become loose, the tenons do not fit the mortices, the draw-bars and their connections are pulled apart, and the whole structure becomes a shackly affair ready to fall to pieces. It is the strains which produce these effects which are more difficult to resist than the mere weight of the load carried, although of course it is essential that the frame of the structure should be built on correct principles.

Mr. Hill says he would not use a buffer timber, but a continuous draw-bar and simply a buffer block in front. There can be no doubt but a continuous draw-bar is a good thing, but the service which it performs is that of drawing and not buffing. The compressive strains in the draw-springs must be transmitted to the car body and from it to the next one to it, and so on. It is safe to say that the draw-gear, as it is called, must resist greater strains of both compression and tension than any other portion of a car. It should also be remembered that for resisting concussive strains of compression wood is a better material than iron, which suggests the idea of having for iron cars continuous draw timbers as well as continuous draw-bars.

So far as the construction of trucks is concerned, iron is now rapidly superseding wood. Iron bolsters for car bodies are also rapidly coming into use, so that the problem of iron cars is in reality narrowed down to the construction of the floor, side and end framing.

It must be admitted, though, that the discussion of this subject has not thus far convinced railroad managers that iron cars are cheaper than wooden ones, and that consideration will of course determine whether railroad companies will order the former instead of the latter. In fact, if we look over the published discussions of the subject, this view of the case has hardly been discussed at all, at least in an analytical way. A little investigation of the latter kind may possibly shed some light on the subject and make clear what is now involved in hazy ambiguity.

It may be stated generally that the cost of the repairs of freight cars is about 5 per cent. of the total operating expenses of a road. Of course it varies on different roads, but, for our present purpose, this assumption will be a sufficiently close approximation.

In analyzing expenses like car repairs, it is always a great aid if we have a bill of particulars, or the different items of expense, so that it can be known where the money goes to. Fortunately we have before us a copy of the excellent report of car expenses prepared by Mr. DeFuniak, of the Louisville & Nashville Railroad. In this report—for the year ending June 30, 1878—the cost per car mile is given as follows:

	Cost per mile in cents.
Labor.....	0.1726
Lumber.....	0.0529
Wheels.....	0.1179
Axles.....	0.0261
Bearings.....	0.0618
Wrought iron.....	0.0513
Iron castings.....	0.0310
Draw-heads.....	0.0103
Springs.....	0.0169
Roofs.....	0.0061
Paints.....	0.0077
Sundries, stores.....	0.0163
Total...	0.5709

By looking over this list, it is obvious at a glance that none of the items printed in italics would be diminished or affected in any way by constructing cars of iron instead of wood. The aggregate cost of these items is 0.2391 cent, or very nearly one-half of the whole expenses of freight-car repairs. The cost of "wrought iron" would doubtless be increased if iron were used instead of wood, and, probably, also the cost of "paint," because iron is more subject to deterioration if unpainted than wood. There would be very little, if any, difference in the cost of "iron castings." Therefore, the only items in which there could be any material saving would be in the cost of "labor" and "lumber," and, perhaps, "stores," which, altogether amount to 0.2418 cent per car mile. The cost of lumber for repairs is doubtless due, chiefly, to decay, but it must be kept in mind that even with iron cars such parts as the flooring, portions of the roof and inside lining are still made of wood, so that probably the cost for lumber for repairs of iron cars would still

be a fifth of what it is for wooden cars. If this is true, the saving in lumber would represent 0.0424 cent per mile. Assuming, still further, that the saving in "stores" with iron cars will be equal to the increase in cost of "wrought iron," we have only the two items of "labor" and "paint" left. The cost of labor for repairing or replacing wheels, axles, bearings, draw-heads and springs would evidently be the same for both wooden and iron cars, and the labor of painting would be increased for the latter. The saving in labor would be in that which is needed in replacing decayed timber, which forms so large a portion of car repairs. If we assume that one-third of the cost of labor for repairs would be saved if iron cars were used, and the cost of paint be doubled, our account would stand as follows:

Saving in cost of lumber	0.0424	cent per car mile.
" " labor	0.0575	" "
	0.0999	cent per car mile.
Less extra cost of paint	0.0077	" "
Saving due to use of iron cars	0.0922	cents per car mile.

This would be over 16 per cent. of the total cost. These figures must not be accepted as representing the actual difference in the cost of repairs. They are based upon assumptions which are not proved, and hypotheses which may or may not be true. All that they indicate is the probability or possibility that the cost of repairs of iron cars *may be* very materially less than of wooden cars. This inference has been arrived at after eliminating all the known elements of the problem, and then making what seem probable assumptions regarding the greater endurance of iron compared with wood. Iron cars, of course, might be built which would cost much more to maintain than wooden ones, owing to bad design and insufficient strength of parts, so that the cost of repairs for that reason would be very much greater than that due to the decay of wood. What our figures indicate very clearly is, that if an iron car could be built of strength and capacity to resist wear equal to those of a wooden car, the greater endurance of iron would result in a great saving of cost which must now be incurred to replace the decayed wooden parts of cars.

Whether iron cars will ultimately be cheaper than wooden ones will depend upon their relative cost and endurance. This can be illustrated if we take the data given above, and assume the mileage of freight cars to be 15,000 miles per year, which is very near the average on most roads. The cost of maintaining a wooden car at 0.5709 cent per mile would then be $85.63 per year. If it costs 0.0922 cent less to maintain an iron car, the cost per year would be only $71.80, or $13.83 less than the cost of maintaining a wooden car. The latter sum is 7 per cent. interest on $197.57. Let us assume now that a wooden car costs $450 and an iron one $197.57 more, or $647.57 and let us then calculate the cost of service on this basis, and if we leave out of the account the interest on the money expended, at the end of ten years the wooden car would have cost $1,306.20 and the iron car $1,365.57. Supposing, though, that the life of the wooden car is ten years and that of the iron car fifteen, then the whole cost of the service per year of the former would be $130.63, whereas that of the latter would be $114.97. It should be said again that these figures are not given as representing anything excepting the possibility that the economy they indicate *may* be realized by the use of iron cars. Whether such will be the case will depend largely upon the skill with which the latter are designed. The calculations indicate that the use of iron cars is worthy of the consideration of railroad managers.

THE LOW COST OF RAILROAD CONSTRUCTION may be inferred by the report which the Illinois Central makes of the cost of the Kankakee & Southwestern Railroad which it had built last fall and now works as its "Chatsworth Branch." The length of this road is 37 miles, and its total cost is reported to be about $250,000, or $6,760 per mile. This does not include any equipment, but does stations and fencing and everything requisite to fit the road for operation with the Illinois Central's rolling stock. The road is laid with old rails from the Illinois Central, charged at their current market price—probably about $20 a ton. This is often the best possible use to make of old rails, which may often give many years' good service on a new branch after they have become uneconomical in main track where there are many heavy trains and some run at great speed. But, after all, the saving made by the use of old rails instead of good iron new ones is not likely (even with 56 lbs. rails) to amount to more than $1,350 per mile of track. It should be said, however, that the Kankakee & Southwestern is over the flattest of flat prairies, where the earth-works were probably very light. But a great deal of the country in Minnesota, Iowa, Missouri, Kansas and Nebraska where there is room for new railroads, and some day will certainly be a liberal support for them, is but little more difficult. With such credit as the Illinois Central now has, a branch like this can be supported with net earnings of little more than $400 per mile, which in many places could be earned from a gross traffic of $1,200 per mile or even less (the proportion of expenses is likely to be very high where traffic is very thin, and in a country where there are several competing railroads not very far off the expenses may very easily exceed the gross earnings). But in many places in the states we have named rates will not be much affected by competition; and a cheaply-built branch will support itself from the first, or nearly so, give to the main line a traffic that otherwise might not be developed for years or be diverted to another line, and secure a permanent source of profit hereafter, paying good interest on the original capital and the additions that will be needed to fit it for its growing traffic and the faster speed which may become necessary. The great companies, which have great advantages for undertaking such lines, seem to be alive to this. A very large part of the work of 1878 in the Northwest was done by them, some of it in extensions, and some of it in branches. The cost of this new work has not been definitely reported in many cases, but wherever it has been, it has been very low. There is still room for new roads of this kind, though it is still possible to build them before their time. Should we have a good harvest next summer we look to see a considerable extension in the more thinly peopled parts of the prairie country.

THE REAGAN BILL (to regulate inte-rstate railroad transportation) is now in the hands of the Senate Committee on Commerce, which has appointed a sub-committee especially to consider it. This sub-committee has decided to hear arguments for and against the measure, and has sent notice thereof to the trunk lines and other leading railroad companies. It is to be hoped that this notice will be heeded, and that the companies will set forth definitely their objections to the bill, what they object to especially, and why they object. If they will do this fully and frankly, we are mistaken if some of them do not, while showing sufficiently the impracticability of the bill as it passed the House, at the same indicate pretty clearly that they would welcome a measure which would prevent all railroads from making rebates and special contracts giving one party more favorable rates than another for identically the same service at the same time. Not only is there a feeling that such legislation, if it were confined to that and uniformly and universally executed, would be welcome to the railroad interest; but there are some who seem almost ready to ask for it in behalf of the railroads, and there would be more if it were not for the prevailing belief, too well justified by experience, that railroad legislation in this country is sure to be blundering and most likely to be oppressive; and that a wise measure which might do the railroads good would be likely to be followed by other legislation which most probably would be harmful.

THE ILLINOIS CENTRAL RAILROAD REPORT (only the preliminary report, with balance sheet and a bare statement of net earnings, is issued as yet) shows the net revenue over rentals in 1878 from all sources to have been $492,690 more than in 1877, which increase is equal to about 1.7 per cent. on the stock of the company. The surplus above rentals and interest charges for the past nine years has been:

1870	$2,849,135	1875	$2,232,282
1871	2,483,051	1876	1,696,804
1872	1,904,477	1877	2,661,707
1873	2 829,555	1878	2,405,532
1874	2,361,752		

The surplus profits, therefore, were larger in 1878 than before since 1873, and equivalent to more than 8 per cent. on the stock. Only 6 per cent. was divided, a balance of $665,532 (equal to 2.3 per cent. on the stock) being left, part going, probably, into new construction. This is done while the company's investment of about $5,000,000 in its southern connection has yielded scarcely any direct return; but the Iowa leased lines were more productive last year than ever before, probably, and certainly much more than they will be this year.

This company is distinguished for the small proportion of its capital which is in bonds. It owes, or is liable, for but about $12,000,000, while its assets amount to $43,000,000. In the worst of years its interest charges have been but about one-quarter of its net revenue.

EAST-BOUND RATES are more satisfactory than was to be expected a few weeks ago, considering the delay in establishing the pools. The larger part of the traffic is still done on contracts, it appears, and the rates on these, as nearly as we can ascertain, are generally about 10 cents per 100 lbs. below the tariff of Nov. 25—about 25 cents for grain and 30 cents for provisions. Unsatisfactory as these rates are, they are still much better than were had last winter at this time and later. Generally there seems little disposition now to cut rates, though this may be due largely to the difficulty there has been in getting shipments through. Some of the roads have been much less anxious to get more to carry than to get the freight already shipped through over their snow-blocked tracks. This blockade, which has greatly reduced receipts at New York and Boston, seems to have had no effect on the export trade, for ocean rates have risen meanwhile. Quotations Tuesday from New York to Liverpool, by steam, were 6d. to 7d. (the latter price asked) per bushel for grain, 3s. to 3s. 1½d. per barrel for flour, 35s. per ton for bacon and ¼d. per pound for cotton.

THE LONDON COAL TRADE seems as large as might be expected, considering the enormous population, which is nearly as great as that of the whole state of New York. There was brought to the city in 1878 8,794,576 tons, against 8,591,683 tons in 1877. Of the receipts in 1878 3,198,309 tons, or 36.4 per cent., were by sea, the rest by railroad and canal—substantially all by rail. The Midland brought the most—1,731,039 tons. The London & Northwestern follows, with 1,260,742 tons. Of the total London receipts 2,115,446 tons—nearly a quarter of the whole—were exported or shipped out of London—just about half of it exported. The average price in London in 1878 was about $4.60 per ton. The city consumption would appear to be about 6,700,000 tons. The English railroads have to compete with sea-going vessels for their coal freights; but it does not appear that this compels them to make as low rates as are often had in this country. Just what the rates to London are, however, we do not learn. For interior shipments, similar freights (pig-iron, for instance,) are made for distances of a little more than 100 miles at the rate of a little less than two cents per ton per mile.

STEEL AND IRON RAILS have become nearly of the same price in Europe. At a recent letting in Belgium, the lowest price at which iron was offered, was but $2 per ton less than for steel, and the great Cockerill Works of Seraing bid the same price ($26.25 per ton) for iron and for steel, being the lowest bidder for steel. Very little difference is made in England also, and it is probable that really good iron rails would cost just as much as steel.

NEW PUBLICATIONS.

Railway Law for Railway Men.—This is the title of a very little book of about 60 pages, by Charles L. Bonney, of the Chicago bar, just published by the Railway Age Publishing Company, designed, as the author says in his preface, as "a small and inexpensive, yet comprehensive and explicit, pamphlet, for the legal instruction of railway employés."

The book is mostly devoted to the law as affecting passenger traffic, the titles of the six chapters being: "The Care of Passengers," "The Passenger's Ticket," "The Ejectment of Passengers," "The Passenger's Baggage," "The Duties of the Employé" and "The Liability of the Employé." The method of treatment is not a direct, consecutive statement of the law, but the presentation of the substance of decisions, such as is given in head notes to the reported decisions, many of which are given in our column of "Railroad Law," or citations from such decisions. It is perhaps not the shape in which the average train-man or other employé can easiest learn the law, but it has the advantage of being authoritative. Besides, very brief general conclusions are given at the close of each chapter which summarize very briefly the law as set forth in the preceding citations. And there is a large class of employés who need to know the law. They have to make contracts, or represent the company in other transactions with individuals, and they are liable to involve their employers in difficulty if they do not know pretty accurately the limits of their and the company's legal power. It is more important for some of the employés than for the officers, perhaps; for the latter usually have good legal advice at hand to which they can resort when questions arise, which is not the case with the train-man or the isolated station agent.

The book has a full index of subjects, and also of cases cited.

The book is a small one—it would make about seven pages of the *Railroad Gazette*—and the "conclusions" which are what the employé is called upon to remember, would make little more than a column of this paper; but this is an advantage, not a defect. Railroad employés are sure not to give much time to anything of the kind, and if the points necessary for them to know are covered, brevity is only less important than clearness in the manual from which they are to learn.

A Diary for 1879, of very convenient form, is issued by the Taylor Iron Works, of High Bridge, N. J. Besides the usual divisions of a pocket diary, it contains some thirty pages of tables and rules very convenient for reference, including tables of weight and strength of materials, areas, rules for mensuration, screw-threads, and similar matters, which it is often very convenient to have at hand when larger books of reference are not attainable. Accompanying this is some advertisement of the Taylor Iron Works, but not an unreasonable or obtrusive amount.

Transportation in Congress.

In the House on the 20th, bills were introduced:

By Mr. Tucker, of Virginia (by request): regulating the compensation of railroads for carrying the mails.

By Mr. Elam, of Louisiana: granting right of way and making grant of land to the New Orleans, Texas & Colorado Railroad.

By Mr. Turner, of Kentucky: to regulate charges on Pullman palace and other sleeping cars patented by the United States.

In the Senate on the 22d:

Bills on the calendar being taken up, the Senate passed the bill to declare certain lands granted to the Pacific railroad companies by acts of July 1, 1862, and July 2, 1864, subject to taxation by the states and territories in which they may be located.

"Cut" Freight Rates in the Lumber Trade.

The following is an editorial in the *Northwestern Lumberman* of Jan. 18:

Twice during the year which has but just closed the lumbermen of this city have enjoyed a brief season in which the rates of rail transportation for their commodities to points on the Missouri River have been unusually low. Along in the spring the tariff dropped down to $30 per car, remaining at that figure or thereabouts for some little time, and in the latter part of December a still lower point was reached, the open rate for a couple of weeks or so being only $25 per car. For roads that pretend to pool their business and work upon a uniform scale of charges, this is a rather remarkable record, and one which suggests to the fertile imagination of a Chicago manipulator of pine a good many future possibili-

ties in the way of similar "cuts." It would be hardly safe to say that these expectations will be realized, but it would be still more hazardous to affirm the opposite. The experience of 1878 proves that railroad companies, even when they have combined their interests in a pool, are not always to be depended upon to carry out the agreements they have entered into, and though a new and, presumably, iron-bound combination has been formed for the present year, it would not be very surprising if it should be several times broken and repaired before it is, in the natural course of events, replaced by a new one.

The probibility that "cut rates" will not be wholly unknown to the records of the lumber traffic in this market for the present season, brings up a question as to whether or not such wide fluctuations in transportation charges are an advantage to the trade, which we think it will be well for lumbermen to consider carefully. Looking at the matter from an outside standpoint, and without any pecuniary interest in it to warp our judgment, we have to record the opinion that "cut rates," and, in fact, all varieties of discrimination in freights, are thoroughly evil in their tendency and results. They may prove of some temporary benefit to a particular distributing point, but only at the expense of some other one. The demand which the last reduction in the western rates created was altogether of a speculative character. It had not the slightest effect in increasing consumption, and the trade is not a single foot better off, as far as the aggregate stock unsold goes, than if it had never occurred. Some firms, like those which established yards in Kansas or Missouri, or the few retailers that are able to buy in advance of their requirements, no doubt took advantage of the opportunity to save something in their freight bills, but beyond this we do not see how anybody connected with the lumber business can nave been benefited by it.

On the other hand, it is necessary to go but a little way into the merits of the case to see that this kind of discrimination, in common with every other, works injury to the business as a whole. What is gained here is lost at competing points, and so if we find operators in high glee over a reduction in the freight tariff in one market, we may look with considerable confidence for weeping and gnashing of teeth somewhere else. There is a law of compensation which governs these things, and there is no escaping it's operation. It might be argued that what is saved in freights is so much gained for lumbermen; but, unfortunately, the facts will not bear out any such supposition. The penny saved invariably finds its way into the pockets of consumers, and the good which the lumber dealer, either wholesale or retail, gets out of it amounts practically to nothing. Discrimination, too, works disadvantageously to the trade in other ways. It increases the volume of trade in one section at the expense of another, and thereby causes undue competition, the ill effects of which every one in the trade ought to be perfectly familiar with. The present condition of business in Minneapolis and Stillwater, Minn, furnishes a notable example of it. Because of an unfair adjustment of the tariff to southwestern points these markets have been driven from a field which belongs to them as much as to Chicago, if, indeed, their claim by right of prior possession is not a better one, and the only thing that can be brought forward as an offset to this loss is an almost imperceptible increase in the shipments from this city. Chicago gains something, it is true, but the lumber trade does not profit by it to the extent of a farthing; on the contrary, it sustains an actual loss, both directly and indirectly, in the diverting of trade from its natural channels, and the disturbances which must necessarily result therefrom. It is impossible to determine exactly what the loss or the profit from "cut" rates amounts to, but we are inclined to believe that, if a balance could be struck, the debit side of the account would be found much the largest.

The *Lumberman* does not expect that the practice of cutting rates will be abandoned because it is unjust and unfair. Abstract fairness is practically obsolete among business men, and there is no more reason why we should look for it in this connection than any other. As long as there are lumbermen to ask favors, and railroads to grant them, "cut" rates will be almost as common as regular ones. It may not be generally known, but it is really a fact, that railroads frequently pay back to shippers anywhere from 10 to 50 per cent. of the nominal tariff in the way of rebates. It is by such devices that dealers are enabled to send out delivered lists, and make such astonishingly low prices for stock laid down at the retailer's yard. Of course it is all done by special arrangement, and it is supposed that the terms made are private; but they soon leak out, and others demand special privileges too. It does not take long, then for freights to become completely demoralized, and the published rates to lose what little significance they may have previously possessed.

We say this is wrong; but we can suggest no remedy. There is none, in fact. It is one of those evils which must cure themselves, if they are ever cured, which in the light of the present outlook is a very doubtful possibility, indeed.

In the market report of the same paper the following passage appears under the head of "rail freights":

In the matter of rail freights things are moving along steadily, and the parties to the great southwestern pool are undoubtedly happy. When the time comes for active operations, and it is found that the established tariff works against the sending of Chicago lumber across the two great rivers of the West in as great quantities as last year, it is probable that there will be a grand kick all along the line, and the pool-managers may well look out for squalls. The present rate of $60 per car of 24,000 pounds seems to be too high. No one complains at the pooling plan if the combination tariff be a fairly reasonable one. Lumber shippers are as much averse to "cut" rates as railroad stockholders; they are of no advantage whatever to trade and of the two are an actual detriment. The best thing for all parties—buyer, seller, and carrier—is a steady rate at as low figures as the roads can take the business, which permits shippers to make contracts with some degree of certainty that they will not get scooped by a railroad row before they are half completed. From the present outlook it would seem that the managers of the pool will be compelled before they get much farther into the season to either reduce the tariff to Missouri river points or see their combination go to pieces. The Mississippi River will have a stock for market this season that will not fall far short of 1,500,000,000 feet. Chicago will have over 1,200,000,000, and eastern markets will have all they can take care of from eastern Michigan and Canada. This enormous crop of nearly 3,000,000,000 feet must be put on the western market in some way, at some price. The railroad companies, it is true, have hitherto done more for Chicago lumbermen than they have done for themselves, until, as one operator tersely puts it, "the lumber business in this town has got to be little more than a freighting business." If the present rate is found to be too high, and the Wabash begins taking lumber from Toledo to the Mississippi, and the Western Union from Milwaukee and Racine, it is highly probable that a break will occur. In the meantime it is a good thing to try the pooling business while there is little fear of any great pressure being brought to bear upon it.

And again, in the same journal, but appearing in a letter from a Boston correspondent, is the following:

There are three barriers, or rather hindrances, which are growing more and more evident every year, to a successful and continuous trade with the West in pine lumber, dressed and in the rough. First, the competition which Canada lumber affords. Dressed at Burlington in a most perfect manner, uniformly sorted, and with a low freight, the stock can be laid down here at prices which interfere seriously with those the western manufacturers require. Second, the fluctuating freights between the East and West, now up and then down, create an uncertainty which is seriously felt. Could the arrangement of a summer and winter rate, not too low, but averaging according to the season, and not cut or changed, be effected, this obstacle would be removed, and we should be able to figure with a certainty which now it is impossible to do. Third, the want of a systematic inspection. We find different grading and numbers in Albany, Cleveland and Chicago, and a lack of uniformity, often, within the same section. * * * * * Could these three points be established, we think a better state of affairs would exist.

Does the Wearing Power of Steel Rails Increase with the Hardness of the Steel?*

BY CHAS. B. DUDLEY, PH. D., CHEMIST, PENNSYLVANIA RAILROAD, ALTOONA, PA.

While working during the summer of 1877, upon the "Chemical Composition and Physical Properties of Steel Rails," the results of which are given in my report† with this title, I was struck with the surprising wear which some of the rails, which would ordinarily be called soft rails, had endured. At that time I knew of no chemical measure of softness except low carbon, and I found that a number of rails with low carbon had endured as high or higher tonnage, with apparently as little loss of metal by wear as those with higher carbon. My own work on steel rails that summer did not embrace any definite experiments as to the amount of metal worn off the rail per million tons which had passed over it; and so I could get no more definite answer from that work, to the question at the head of this paper, than was given by comparing the appearance of the worn section of the rail with its tonnage. This comparison, however, served to arouse in my mind the query whether the commonly received opinion as to the relation between the hardness and wearing power of steel is correct, as applied to steel rails. This opinion, if I am right, is: The harder the steel the better will be the wear, and the limit of hardness is simply one of safety; hard, brittle steel being, of course, more liable to break than soft, tough steel. The query, although aroused, did not bear any immediate fruit, and, as will be evident to any one reading it, the report above referred to was written with the commonly received opinion in mind. Since that time I have collected a little information upon this subject, which I should be glad to submit to the Institute, if for no other purpose, for the sake of arousing attention, and directing study to the question of hardness *versus* wear in steel rails.

Before making known the information, however, permit me a few words in reference to hardness. How shall we measure the hardness of steel? Of the various ways of getting indications as to the hardness of steel, which are known, three will serve our present purpose. These are: 1st. High carbon. It is generally agreed, I think, that at least within proper limits, the greater the amount of combined carbon in a piece of steel, the harder the steel, and I need not do more than mention this fact to obtain your assent to it. 2d. The physical test of punching measures the hardness of steel. Data in regard to the wearing power of hard and soft rails, determined in this way, will be given below. 3d. The sum of the phosphorus units in a piece of steel measures its hardness. Phosphorus units, as is fully described in my report above referred to, are an attempt to measure the hardness of steel by estimating the combined hardening power of the phosphorus, silicon, carbon and manganese in a piece of steel, in terms of the phosphorus. Now, by measuring hardness in these three ways, I have been able to collect the following information with regard to the relation between the hardness and wearing power of steel rails.

1. Some two years ago the Pennsylvania Railroad Company, in view of the unsatisfactory wear it was obtaining from its steel rails, asked to have more carbon put into its rails, with a view of making them harder, to resist wear. Before the increase the limits of carbon for rails to be used on Pennsylvania Railroad, was from 0.30 to 0.50 per cent. After the increase the limits were from 0.40 to 0.50 per cent., thus securing on the average, perhaps, about a tenth of a per cent. more carbon in the steel. Now Mr. W. H. Brown, Chief Engineer Maintenance of Way, Pennsylvania Railroad, informs me that these rails of higher carbon are giving poorer wear than before the lower limit of carbon was raised. This opinion of Mr. Brown is based on his observation of the wear of these higher carbon rails, and on the number of renewals of these rails rendered necessary by the condition of the track.

2. Mr. J. T. Smith, General Manager of the Barrow Hæmatite Steel Works, England, read a paper on "Bessemer Steel Rails," before the Institution of Civil Engineers, in 1875.‡ The object of the paper was to show that Bessemer steel may be produced constant in quality, and that certain inexpensive tests may be applied, which shall determine the quality of the metal for railway purposes. The test proposed by Mr. Smith was to punch the fish-plate holes with a registering-press, the quality of the metal being judged of by the force required to punch the holes. This would render it possible to inspect and judge of the quality of every single rail. I must refer you to Mr. Smith's paper for further information upon this point.

The point which is of especial interest to us now is that Mr. Smith examined thirty rails which had been eight years in service on the main line of the Furness Railway.§ The rails were divided into two classes, on the basis of the force required to punch a hole ⅞ of an inch in diameter, through the web ⅝ of an inch thick. Twenty of the rails required for this purpose a force varying from 46¼ to 52½ tons, and were therefore called soft rails; while the remaining ten rails required for the same purpose a force varying from 56¾ to 82½ tons, and were therefore called hard rails. The average force required to punch the soft rails was about 49 tons, while for the hard rails this average force was about 64¾ tons. Mr. Smith likewise gives the determinations of the carbon in these rails. In the twenty soft rails the carbon varied from 0.28 to 0.32 per cent., or an average of 0.30 per cent., while in the hard rails the carbon varied from 0.36 to 0.57 per cent., with an average of 0.44 per cent. Now as to the wear of these rails. The wear seems to have been determined by taking the difference between the original weight of the rail per yard, and the weight per yard of the worn rail, and then reducing this to the percentage of the metal worn off. Now in the twenty soft rails, this percentage of wear varied from 10.38 to 16.24 per cent, with an average wear of 13.54 per cent., while in the ten hard rails the percentage of wear varied from 12 to 20.53 per cent., with an average of 15.18 per cent. These figures seem to me very significant, and to warrant Mr. Smith in the conclusion which he expresses, viz.: "Contrary to what might have been anticipated, greater hardness has not conduced to the longevity of the rails, and the softer ones show the minimum of wear."

3. With regard to the wear of rails, in which the hardness is measured in phosphorus units. On May 23, 1876, Mr. R. Price Williams read a paper before the Institution of Civil Engineers, on "The Permanent Way of Railways."§ In his investigation into the subject of steel rails, Mr. Williams found such a surprising difference in the wear of certain rails which were side by side, and therefore subjected to the same traffic, that he had seven of these rails from the Great Northern Railway analyzed by Mr. Edward Riley. The results as to wear are given in number of million tons traffic per $\frac{1}{16}$ inch worn of the rail. Four of these seven rails measured in phosphorus units, sum up 31, 30, 32 and 25, and may, therefore, be called, in comparison with the others, soft rails. The remaining three rails sum up, in phosphorus units, 38, 40 and 47, and may be called hard rails. The rails are numbered in Mr. Williams' series, Nos. 9, 17, 18, 21, 22, 23 and 24. Nos. 17 and 18 were side by side, and subjected to the same traffic. The phosphorus units in No. 17 are 38, and in No. 18, 30; one hard and one soft, as is seen. The hard rail withstood 5,251,000 tons per $\frac{1}{16}$ inch wear, while the soft one withstood 8,402,000 tons per $\frac{1}{16}$ inch wear. Again, Nos. 23 and 24 were side by side. The phosphorus units in No. 23 were 47, and in No. 24, 25, one hard and one soft, as before. The hard rail withstood 15,531,000 tons per $\frac{1}{16}$ inch wear, while the soft rail withstood 31,061,000 tons per $\frac{1}{16}$ inch wear. In Nos. 21 and 22, which were side by side, the hard rail shows a little the best wear, the figures being 9,233,000 tons per $\frac{1}{16}$ inch wear, for the hard rail, and 7,676,000 tons per $\frac{1}{16}$ inch wear for the soft rail. If now we take the average of the tonnage per $\frac{1}{16}$ inch wear for the three hard rails and four soft ones, the result becomes quite striking. The four soft rails withstood an average tonnage of 15,567,000 tons per $\frac{1}{16}$ inch wear, while the three hard rails withstood, on the average, only 10,055,000 tons per $\frac{1}{16}$ inch of metal worn off. The chemical composition of the one rail of this series which withstood the highest tonnage, viz., 31,061,000 tons per $\frac{1}{16}$ inch wear, is so remarkable that I cannot forbear quoting the full analysis. This rail sums up 25 in phosphorus units, and contains: carbon, 0.270 per cent.; phosphorus, 0.100 per cent.; silicon 0.020 per cent.; manganese, 0.259 per cent.; sulphur, 0.051 per cent.; copper, 0.025 per cent.; and iron, 99.475 per cent.

If enough has been said on this subject to direct attention to it, my object will have been accomplished. It is perhaps too soon to venture conclusions. The indications would seem to be, however, that under the conditions of wear to which a steel rail is subjected, viz., rolling friction, unlubricated surfaces, and great weight with small bearing surface, the quality of the metal necessary to most successfully withstand the disintegrating forces, is best expressed by the word toughness, and not by hardness.

ALTOONA, Pa., Oct. 12, 1878.

* A paper read before the Institute of Mining Engineers, Oct. 15, 1878.

† See the *Railroad Gazette* of Jan. 17, 1879.

‡ Proceedings Inst. Civil Eng., vol. xlii, p. 69.

§ Proceedings Inst. Civil Eng., vol. xlvi, p. 147.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Missouri Pacific, annual meeting, at the office in St. Louis, March 4, at noon. Transfer books will be closed from Feb. 1 to March 6.

Huntingdon & Broad Top, annual meeting, at the office, No. 417 Walnut street, Philadelphia, Feb. 4, at noon.

Dividends.

Dividends have been declared as follows:

Illinois Central, 3 per cent., semi-annual, payable March 1. This makes 6 per cent. for the year.

North Carolina, 6 per cent, annual, payable 3 per cent. March 1, and 3 per cent. Sept. 1. Leased to Richmond & Danville.

Mail-Service Extensions.

Mail service has been ordered over new lines or extensions of old lines, as follows:

Chicago, Burlington & Quincy, service ordered over new branches from Chariton, Ia., to Lacona, 14.51 miles; Creston, Ia., to Greenfield, 23.90 miles; Hastings, Ia., to Sidney, 21.07 miles.

Missouri, Kansas & Texas, Denison & Southwestern Branch, service ordered from Denison, Tex., to Whitewright, 21.23 miles.

Chicago & Tomah, service ordered from Woodman, Wis., to Lancaster, 30.91 miles.

Macon & Brunswick, authorized to carry closed daily mails over its steamboat line from Brunswick, Ga., to Fernandina, Fla., 40 miles.

Foreclosure Sales.

The *Eastern Shore* road will be sold under foreclosure of mortgage at Princess Anne, Md., Feb. 19. The road is 38 miles long, from Delmar, Md., to Crisfield, forming an extension of the Delaware road. Its bonded debt is as follows: First-mortgage bonds, $400,000; overdue interest, $250,000; second-mortgage bonds, $187,250; overdue interest, $125,000; total, $962,250. The annual interest charge on the bonds is $35,235. In eight years the net earnings have amounted to $205,041, or $25,630 a year; they have all been applied to purchase of equipment, improvements of road, and payment of a debt incurred to the Philadelphia, Wilmington & Baltimore, during four years, from 1866 to 1870, when that company worked the road.

Western Railroad Association.

The annual meeting was held in Chicago Jan. 14, Hon. B. C. Cook, General Solicitor of the Chicago & Northwestern Railway, presiding.

The annual report of the Executive Committee, which we publish elsewhere, was read. Its recommendation to increase the number of the board of directors from nine to twelve was adopted.

The report of the financial position of the Association, submitted by Mr. J. H. Raymond, the Secretary and Treasurer, showed the following:

Balance at beginning of year	$3,434
Amounts received from companies belonging to the Association (an average of $329 each)	27,751
	$31,185
Disbursements during the year	29,390
Leaving balance at close of year	$1,795

The directors for the ensuing year and the officers of the Association were then chosen, as elsewhere chronicled, and the following resolution was adopted:

"*Resolved*, That the board of directors is authorized to appoint mechanical experts to examine into and report upon the merits of inventions affecting railroad interests, pro-

vided each inventor or other applicant pays to the Association not less than $100 for each examination, and in addition the fees of the experts, the cost of making examinations and experiments and the expense of printing the reports and distributing them among the members of the Association."

Nothing will be done under this resolution until after the next meeting of the Executive Committee, Feb. 6, at which time the conditions and provisions for carrying them into effect will be determined.

Southern Railway & Steamship Association.

A called local meeting was held in Atlanta, Ga., Jan. 13. There were present General Commissioner Virgil Powers, Secretary C. A. Sindall, and the following railroad officials: L. P. Grant, General Superintendent Atlanta & West Point; George W. Adams, General Superintendent Macon & Brunswick; E. P. Alexander, President, and E. R. Dorsey, General Freight Agent Georgia Railroad; James L. Taylor, General Freight Agent Atlantic & Gulf; D. C. Wilson, President; R. G. Fleming, General Superintendent, and J. S. Davant, General Freight Agent Port Royal & Augusta; C. S. Gadsden, General Superintendent Savannah & Charleston; Cecil Gabbitt, General Manager; S. D. Hubbard, Jr., General Freight Agent Western of Alabama; James R. Ogden, General Freight Agent East Tennessee, Virginia & Georgia; Ray Knight, General Freight Agent Selma, Rome & Dalton; George J. Foreacre, General Manager; R. D. Carpenter, General Freight Agent Atlanta & Charlotte Air-Line; J. M. Selkirk, General Agent of the Great Southern Freight Line *via* Charleston; T. M. R. Talcott, General Superintendent; Sol. Haas, General Freight Agent Richmond & Danville, and Charlotte, Columbia & Augusta; Eben Hillyer, President; C. M. Pennington, General Superintendent Rome Railroad; John B. Peck, General Manager South Carolina Railroad; William Rogers, General Superintendent Central, of Georgia; W. G. Raoul, General Superintendent Southwestern, of Georgia; B. S. Fitch, General Freight Agent Chesapeake & Ohio; William McRae, General Manager, and R. A. Anderson, General Freight Agent Western & Atlantic; E. B. Stahlman, General Freight Agent Louisville & Nashville; George R. Knox, General Freight Agent Nashville, Chattanooga & St. Louis; A. J. Lane, President; R. A. Tarver, General Freight Agent Montgomery & Eufaula.

The meeting was called to arrange the new local rates and other changes made necessary by the new classification adopted at the recent annual meeting; also to consider some changes in local divisions of business. The first day's session was chiefly occupied in a division of the work and its reference to different committees.

On the second day, Jan. 14, the committees reported that they had found their duties such that they had not been able to agree upon a report. The Association then adopted a resolution requesting the committees to be ready to report at a meeting to be held March 19. The reports will then be presented in writing and considered in detail.

Export Rate Meeting.

A further meeting of the committee appointed at the recent meeting of Trunk and Western lines, and of the representatives of the European steamer lines, was held in New York, Jan. 16. The two parties failed to agree, after much discussion, and it was decided to refer the whole matter to Mr. Thomas S. Sandford, Secretary of the North Atlantic Conference, who is to canvass the various steamship companies and draw up a plan based upon their views. This plan will then be submitted to the railroad committee for their action.

It is said that the managers of the foreign steamship lines have agreed upon a plan for fixing rates on through freights for export. The steamship managers are to hold periodical meetings, at which they will fix the ocean rates, and the railroad committee in charge of the export business will then be notified and can add these ocean rates to their through rates to seaboard points. The plan will be submitted shortly to the railroad committee.

ELECTIONS AND APPOINTMENTS.

Chicago, Burlington & Quincy.—Mr. S. D. Reeve has been appointed Trainmaster of the Chicago Division.

Chicago, St. Louis & New Orleans.—Mr. J. F. White has been appointed Master Mechanic in charge of the shops at Water Valley, Miss., in place of J. E. Becton, deceased. Mr. White has been General Foreman for several years and Acting Master Mechanic for some months. He had the courage to remain at his post all through the yellow-fever epidemic, which carried off Mr. Becton.

Cleveland, Tuscarawas Valley & Wheeling.—The following circular issued by General Manager Oscar Townsend is dated Dec. 31:

"Mr. W. W. Card having resigned the position of Superintendent of this company, to take effect this day, that office is hereby abolished, and the duties transferred to the General Manager. All reports heretofore sent to the Superintendent, will, in future, be addressed to the General Manager, except such as are directed by this notice to be sent elsewhere.

"Mr. Card retains the position of Chief Engineer, and will continue in charge of construction on the Southern Extension, between Uhrichsville and the Ohio River at Wheeling.

"Mr. W. F. Turreff, Master Mechanic, in addition to his duties as such officer, will, from and after this date, have charge of the movement of all trains and trainmen; and in that capacity will be known as Trainmaster. Charts of speeds will be forwarded to him at Black River, O. Mr. V. H. Bell, Train Dispatcher, will remove his office to Black River Station, Monday, Jan. 6, 1879."

Colorado Central.—At the recent annual meeting the following directors were chosen: E. L. Berthoud, O. H. Henry, J. C. Hummel, W. A. H. Loveland, T. I. Richman, J. A. Thatcher, C. C. Welch, of Colorado; Sidney Dillon, Jay Gould, Russell Sage, New York; Frederick L. Ames, North Easton, Mass. The officers chosen are: President and General Manager, W. A. H. Loveland; Vice-President, C. C. Welch; Treasurer, J. C. Hummel; General Superintendent, S. H. H. Clark; Superintendent, A. A. Egbert.

Connecticut River.—At the annual meeting in Springfield, Jan. 15, the old board was reëlected, as follows: S. M. Waite, Brattleboro, Vt.; W. B. Washburn, Greenfield, Mass.; Oscar Edwards, Northampton, Mass.; Chester W. Chapin, Daniel L. Harris, Springfield, Mass.; Roland Mather, Hartford, Conn.; Charles S. Sargent, Brookline, Mass.; Edward A. Dana, I. M. Spelman, Boston.

Delaware Western.—At the annual meeting in Wilmington, Del., Jan. 13, the following directors were chosen: Edward Betts, William Canby, William M. Canby, James L. DeVou, Washington Jones, Henry C. Robinson, Lewis Thompson. The board reëlected William M. Canby, President.

Engineers' Club of Philadelphia.—At the recent annual meeting the following officers were chosen for the year beginning Jan. 11, 1879: President, T. C. Clarke; Vice-President, J. B. Knight; Corresponding Secretary and Treasurer, Charles E. Billin; Recording Secretary, Herman Hoopes; Directors, William G. Neilson, D. McN. Stauffer, Rudolph Hering, Coleman Sellers, Jr., Percival Roberts, Jr.

Galveston, Harrisburg & San Antonio.—Mr. B. T. Davis has been appointed Master Mechanic, in place of B. B. Harrop, resigned.

Lehigh Valley.—At the annual meeting in Philadelphia, Jan. 21, Hon. Asa Packer was reëlected President, and the following directors chosen: James I. Blakslee, William H. Gatzmer, Charles Hartshorne, William A. Ingham, William W. Longstreth, Philadelphia; Robert H. Sayre, Bethlehem, Pa.; David Thomas, Catasauqua, Pa.; George B. Markle, Ario Pardee, Hazleton, Pa.; William L. Conyngham, Wilkesbarre, Pa.; Ashbel Welch, Lambertsville, N. J.; Harry E. Packer, New York. The new directors are James I. Blakslee and Harry E. Packer, who succeed J. Gillingham Fell, deceased, and Joseph Wharton, who declined reëlection.

Mahoning & Pittsburgh.—At the annual meeting in Meadville, Pa., Jan. 13, the following were elected: President, A. S. Dickson; Secretary, J. H. Dynes; Treasurer, J. H. Devereaux; Directors, James E. McFarland, T. B. Lashell, Myron P. Davis, J. H. Lenhart, A. L. Dunbar, Leon C. Magaw, Meadville; John D. Wann, Cleveland, O.

Milwaukee & Dubuque.—At the annual meeting in Milwaukee, Wis., Jan. 18, directors were chosen and classified as follows: For one year—Martin Field, Mukwonago, Wis.; C. W. Smith, East Troy, Wis.; L. F. Watson, Warren, Pa. Two years—Leonard Trimborn, Milwaukee; Wm. P. Acocks, Pittston, Pa.; Noah H. Dalrymple, Sugar Grove, Pa. Three years—Henry M. Benjamin, Milwaukee; Oliver Dalrymple, St. Paul, Minn.; Wm. T. Dalrymple, Pittston, Pa. The board elected Henry M. Benjamin, President; Oliver Dalrymple, Vice-President; Wm. T. Dalrymple, General Manager.

Minneapolis & Dakota Northern.—This company was organized Jan. 7 by the election of the following directors: Asa Sargeant, Chas. W. Morgan, Robert Ray, Frank Viets, Alexander Griggs, John G. Hamilton, Michael L. McCormack. The board elected Frank Viets, President; J. G. Hamilton, Secretary; Michael L. McCormack, Treasurer. The office is at Grand Forks, Dakota.

North Pennsylvania.—The following circular is dated Philadelphia, Jan. 13, 1879:

"Mr. Solomon W. Roberts, who has heretofore been the Chief Engineer and General Superintendent of the company, has this day resigned the position of General Superintendent.

"Mr. Albert H. Fracker has been appointed in his place.

"Mr. Roberts remains as Chief Engineer of the company."

Paw Paw.—At the annual meeting in Paw Paw, Mich., Jan. 14, the following directors were elected: Henry Ford, C. A. Harrison, John Ihling, Geo. W. Longwell, F. B. Adams, E. O. Briggs and J. C. Ford. The directors elected the following officers: F. B. Adams, President; Geo. W. Longwell, Vice-President; J. C. Ford, Secretary; F. B. Adams, Treasurer.

Peach Bottom.—At the annual meeting in Peach Bottom, Pa., June 13, the following were chosen: President, C. R. Meconkey; Directors, A. C. Manifold, Michael Schall, W. L. Small, W. G. Ross, John Humphrey, William Wallace, Samuel Dickey, J. A. Alexander, R. B. Patterson, C. H. Stubbs, J. P. Ambler, Isaac Bradley.

Philadelphia & Baltimore Central.—At the annual meeting in Philadelphia, Jan. 13, Henry Wood was reëlected President, with the following directors: Samuel Dicky, David Woelpper, Job H. Jackson, Edwin Haines, William Ward.

Portland & Ogdensburg.—At the annual meeting in Portland, Me., Jan. 21, the old board was reëlected, as follows: S. J. Anderson, J. P. Baxter, Horatio N. Jose, W. F. Milliken, R. M. Richardson, J. S. Ricker, W. W. Thomas, Jr., S. Waterhouse, Portland, Me.; Joel Eastman, Conway, N. H.

Union Stock Yards Co.—At the annual meeting in Chicago, Jan. 15, the following directors were chosen: John C. Gault, Marvin Hughitt, J. N. McCullough, J. C. McMullin, John Newell, Hugh Riddle, Nathaniel Thayer, Jr., J. M. Walker.

Utica, Ithaca & Elmira.—Mr. Lon F. McAleer has been appointed Superintendent of this road and of the Cazenovia, Canastota & De Ruyter, controlled by it. Mr. McAleer has served on the Baltimore & Ohio and as Superintendent of the National Locomotive Works; for several years past he has been Superintendent of the Painesville & Youngstown.

Western Railroad Association.—At the annual meeting in Chicago, Jan. 14, it was resolved to increase the number of directors from nine to twelve, and the following officers were chosen: President, B. F. Ayer, Illinois Central; Secretary and Treasurer, J. H. Raymond; General Counsel, George Payson; Directors, B. C. Cook, Chicago & Northwestern; A. L. Osborn, Michigan Central; J. C. McMullin, Chicago & Alton; J. M. Walker, Chicago, Burlington & Quincy; T. F. Withrow, Chicago, Rock Island & Pacific; Charles Paine, Lake Shore & Michigan Southern; Thomas Allen, St. Louis, Iron Mountain & Southern; S. F. Merrill, Chicago, Milwaukee & St. Paul; Fred. de Faniak, Louisville & Nashville; George H. Nettleton, Missouri River, Fort Scott & Gulf; Joseph C. Clarke, Chicago, St. Louis & New Orleans; B. F. Ayer, Illinois Central; Executive Committee, B. F. Ayer, A. L. Osborn, B. C. Cook, J. M. Walker, and T. F. Withrow. The new President, Mr. Ayer, succeeds Mr. Robert Harris, who has long held the office, and now retires on account of his removal from the West, and his new connection with an Eastern road.

Winona & St. Peter.—Mr. John E. Blunt is appointed engineer, and will have charge of the track, bridges and buildings.

PERSONAL.

—Wm. A. Burroughs, Treasurer of the New York, New Haven & Hartford, has been required to resign an examination of his books having shown that he was in the habit of making unauthorized loans of the company's money to his friends. The amount missing is said to be about $17,000, of which $12,000 can be recovered, leaving a deficiency of $5,000 to be met by his bondsmen. Burroughs was formerly a clerk in the company's office, and was made Treasurer some two years ago, after Mr. Shelton's death. He does not seem to have profited personally to any extent by his operations.

—Mr. Isaac Jones, formerly a well-known steel manufacturer of Pittsburgh, and for several years President of the old Pittsburgh & Steubenville Railroad Company, died recently at the age of 73 years. He retired from business several years ago.

—Col. Henry Cady, formerly a heavy contractor, died recently at his farm near Hanover Court House, Va., where he had lived quietly since 1860. He had large contracts on the construction of the Genesee Valley and Chenango canals in New York, and on the Erie and Hudson River roads. Before 1860 he lived in Rochester, N. Y.

—Mr. Charles Courter, who died recently in Cobleskill, N. Y., was one of the first projectors and builders of the Albany & Susquehanna road.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

Year ending Nov. 30:	1877-78.	1876-77.	Inc. or Dec.	P.c.
Lehigh Valley	$6,186,022	$7,100,219	D. $914,197	12.9
Expenses	2,456,927	3,162,822	D. 705,895	22 3
Net earnings	$3,729,095	$3,937,397	D. $208,302	5.3
Per cent. of exps.	39.72	44.55	D. 4.83	10.8
Year ending Dec. 31:	1878.	1877.		
Int. & Gt. Northern	$1,625,444	$1,560,455	I. $64,989	4.1
Eleven months ending Nov. 30:				
Galveston, Har. & San Antonio	$1,148,209	$912,063	I. $236,146	25.9
Eight months ending Nov. 30:				
Ogdensburg & Lake Champlain	$381,027	$462,739	D. $81,112	17.5
Net earnings	95,283	.....	.....	....
Month of November:				
Galveston, Har. & San Antonio	$146,406	$104,789	I. $41,617	39.7
Great Western	296,600	365,600	D. 69,000	18.9
Net earnings	72,700	105,500	I. 32,800	31.1
Month of December:				
Intercolonial	$99,439	$111,197	D. $11,758	10.6
International & Great Northern	222,078	199,155	I. 22,923	11.5
St. Louis & S. E., St. Louis Div	57,822	48,514	I. 9,308	19.2
St. Louis & S. E., Ky. Div	27,557	29,674	D. 2,117	7.1
St. Louis & S. E., Tenn. Div	14,819	13,115	I. 1,704	13.0
Second week in January:	1879.	1878.		
Atchison, Topeka & Santa Fe	$77,500	$44,637	I. $32,833	73.5
Chicago, Mil. & St. Paul	145,000	143,850	I. 1,150	0.8
Hannibal & St. Jos.	34,012	29,644	I. 4,368	4 8
Week ending Jan. 11:				
Grand Trunk	$166,208	$165,835	I. $373	0.2

Coal Movement.

Anthracite tonnages for the week ending Jan. 11 were: 1879, 248,508; 1878, 252,323; decrease, 3,815 tons, or 1.5 per cent.

Bituminous and semi-bituminous coal and coke productions not hitherto reported for the year ending Dec. 31 were:

Coal:	1878.	1877.	Inc. or Dec.	P. c.
East Broad Top	63,063	54,738	I. 8,325	15.2
Bellefonte & Snow Shoe	29,169	42,979	D. 13,810	32.1
Allegheny Region, Pa. R. R.	200,139	184,464	I. 15,675	8.5
Penn and Westmoreland gas coal	692,441	786,039	D. 93,498	11.9
West Penna. R. R.	186,308	187,345	D. 1,037	0.6
Southwest Penn. R. R.	25 664	38,910	D. 13,246	34.1
Pittsburgh Region, Pa. R. R.	423,498	373,673	I. 49,825	13.1
Total Coal	1,620,382	1,674,148	D. 47,766	2.9
Coke:				
Allegheny Region, Pa. R. R	5,241	.....	I. 5,241	....
Penn and Westmoreland	78,700	64,905	I. 13,861	21.4
West Penna. R. R	87,994	58,483	I. 29,511	50.4
Southwest Penn. R. R.	736,000	635,900	I. 150,100	23.6
Pittsburgh Region, Pa. R. R	128,900	107,840	I. 21,060	19.5
Total coke	1,083,991	867,218	I. 219,773	25.3

Anthracite shipments just now are limited by bad weather and interruptions to railroad traffic.

Cotton.

Receipts for the week ending Jan. 18, and for the crop year from Sept. 1 till that time are reported as follows, in bales, by the *Commercial and Financial Chronicle:*

	1879.	1878.	1877.	1876.	1875.
Week	113,613	153,727	115,015	142,071	161,698
Crop year	2,953,905	2,794,486	2,863,364	2,782,746	2,411,020

The exports for the same periods were:

	1879.	1878.	Inc. or Dec.	P. c.
Week	113,572	127,722	D. 14,150	11.8
Crop year	1,678,252	1,479,919	I. 198,333	13.4

Of the exports from Sept. to Jan. 10, this year, 23.2 per cent. were from New Orleans, 18.6 from Savannah, 15.5 from Charleston, 10.8 from New York, and 7.2 per cent. from Norfolk.

Union Pacific Live Stock Traffic.

Receipts of live stock at Omaha from the Union Pacific Railroad have been, approximately, for the past three years:

1878.	1877.	1876.
96,000	80,000	48,000

In 1878 the receipts from other sources were about 24,000 head, making total Omaha receipts 120,000.

Pacific Through Traffic.

Shipments of through freight eastward over the Central Pacific in December were: San Francisco, 2,023 tons; interior points, 649 tons; total, 2,672 tons, say 268 car-loads. Leading items of freight were 609 tons wool, 152 tons salmon, 147 tons tea and 147 tons wine. Among the shipments were 54 tons of silk-worms' eggs, which came from Japan, and were bound to Europe.

East-Bound Passenger Rates.

Chicago dispatches of Jan. 22, say that there are rumors of cutting in passenger rates, and that some of the lines are giving rebates or commissions. There are fears of trouble on this account.

Utah Freight Traffic.

The Utah Central road reports its freight traffic for the year ending Dec. 31, at 117,439 tons moved, the chief items being 50,238 tons coal and coke, 24,818 tons ore and bullion, and 3,803 tons lumber.

The Utah Southern carried for the year 107,549 tons of freight, of which 37,858 tons were ore and bullion, 17,879 tons coal and coke, 9,181 tons iron ore and 6,651 tons rock.

Petroleum.

Stowell's *Petroleum Reporter* gives December production at the Pennsylvania oil wells as follows:

	1878.	1877.	Inc.	P. c.
No. of producing wells	10,337	8,458	1,879	22.2
Production, barrels	1,318,678	1,256,058	62,620	5.0
Shipments	992,688	600,019	392,669	65.4
Stock on hand, Dec. 31	4,615,299	3,127,837	1,487,462	47.6

The number of new wells drilling at the close of the month was 218, against 426 a year ago.

Grain Movement.

For the week ending Jan. 11 receipts and shipments of grain of all kinds, in bushels, have been, for the past six years:

	Northwestern		Atlantic
Year.	Receipts.	Shipments.	receipts.
1874	3,027,412	1,334,392	1,890,196
1875	1,611,271	537,430	1,634,316
1876	1,760,946	646,652	1,641,779
1877	2,291,038	908,682	1,546,128
1878	1,987,853	1,185,085	2,602,375
1879	2,936,586	1,277,759	1,778,971

Thus, the Northwestern receipts and shipments have been larger but once (in 1874), while the Atlantic receipts, greatly reduced as they were by the snow blockade, were still greater than ever before, except last year and 1874.

Of the receipts at Atlantic ports 32.3 per cent. were at Philadelphia, 32.1 at New York, 25.4 at Baltimore, 4.1 at Boston, 3.5 at New Orleans, 2.4 at Portland, and 0.2 at Montreal. Not since the winter of 1877 has New York received so small a quantity in a week, though it has a few times received a smaller proportion of the whole. Boston only once in 1877 even received so little. The more southern ports, whose receipts have been little obstructed by snow, seem not to have profited by the blockade of the northern road. Their receipts are also the smallest they have had recently, though the decrease is not great with them. Even New Orleans received less than in any previous week since the yellow-fever epidemic ceased.

The aggregate receipts, however, would have been called very fair for a winter week previous to 1878.

THE SCRAP HEAP.

Railroad Equipment Notes.

It is proposed to establish car works in Minneapolis, Minn., citizens of that place giving ground for the shops, which are to have a capacity of eight box cars per day. The chief mover in the project is Major Paul, of Swissvale, Pa.

J. G. Brill & Co., of Philadelphia, have orders for seven double-deck street cars for Berlin, Germany; six ordinary street cars for Florence, Italy; five eight-wheel street cars and 15 eight-wheel summer cars, 34 ft. long, for the Broadway road in Brooklyn, N. Y.; 30 sugar-cane cars to go to Cuba, and several small sample orders for places in this country and abroad.

Iron and Manufacturing Notes.

The blast-furnace at West Stockbridge, Mass., heretofore known as the Pomeroy Iron Works, has been bought by Theodore Pomeroy, and will be called the Theodore Pomeroy Iron Works.

The mills of the National Tube Works Co., at McKeesport, Pa., started up last week, giving employment to some 400 men. It is said that orders enough are on hand to keep them running several months.

The St. Albans (Vt.) Iron & Steel Works have nearly completed an order for rails for the Old Colony road, and will soon begin on one from the Central Vermont.

The Riverside Iron Works, at Wheeling, W. Va., turned out in 1878, 27,762 tons of pig iron, 5,172 tons of bar iron and light rails, and 250,946 kegs of nails.

The Niles (O.) Iron Co. is running 13 furnaces double turn.

The Susquehanna Rolling Mill, at Columbia, Pa., has started up, the repairs having been finished, with plenty of orders on hand.

Wassaic Furnace, in Dutchess County, N. Y., went into blast last month and is now running on car-wheel iron.

Chattanooga Furnace, at Chattanooga, Tenn., is making Bessemer pig iron for the Roane Iron Co.

The Tuscarawas Coal & Iron Co. is replacing its old furnace at Canal Dover, O., by a new and much larger one.

The Ashtabula (O.) Rolling Mill has been sold to Shoenberger & Co., of Pittsburgh, who are removing the machinery.

The rolling mill at Girard, Trumbull County, O., has been started up by a new concern known as the Corns Iron Co.

It is said that the Lochiel Iron Works, at Harrisburg, Pa., will soon be started up.

The Pennsylvania Steel Works, at Baldwin, Pa., are soon to build a new rail mill, larger than the present one.

M. M. Buck & Co., of St. Louis, have sold the St. Louis, Keokuk & Northwestern Company the tools for its new repair shops.

Bridge Notes.

The Detroit Bridge & Iron Works have the contract for a double-track draw-span, 160 ft. long, over Calumet River at Calumet, Ill., for the Michigan Central road.

The Pittsburgh Bridge Co. has just finished two spans of 100 ft. each, of highway bridge in Westmoreland County, Pa., and has a contract for one 250 ft. span to go to Cincinnati.

The Clinton (Ia.) Bridge Co. has a contract for a highway bridge of two spans, 100 ft. each, combination truss, over the Wapsie River in Clinton County, Ia.

Spikes.

Why is it that a woman never shuts a car door? Also, why does a man always leave it open? And, indeed, why nobody ever shuts it except the brakeman, and he only closes it for the sake of the noise he can make with it?—*Burlington Hawkeye.*

Boston has a large tract of mud bordering on its harbor and known as the South Boston flats. When the Hub feels as if it had some surplus cash, it goes to work and fills in 50 or 100 acres of these flats. When they are filled in nobody wants them, and every year a great amount of eloquence is wasted, chiefly before legislative committees, in proving that the railroads ought to give up their expensive terminal facilities elsewhere, and spend a few millions in providing new ones on the flats.

Jay Gould is generally credited with knowing a good thing when he sees it. It is currently reported that he has sold all his railroad stock and bought a snow-shovel.

Standing item in Boston papers: "John A. and Dr. B. were on trial in the Police Court this morning for conspiracy to obtain money from the Old Colony Company, on the pretense that A. had been injured in the Wollaston accident." To be a Wollaston sufferer is getting played out now as a profession; the sufferer is apt to get an indictment instead of the check he was after. The Old Colony has settled up very liberally for its big accident, but it cannot possibly pay all the lazy men in Boston enough to keep them through the winter.

A New York Central man threatens an organized movement to abolish "Old Probs," if this snow business is not stopped pretty soon. It is also reported that one of the persons who claim to be the author of that famous poem "Beautiful Snow" was set upon in the East Buffalo yard and narrowly escaped with his life.

A road in Western New York is voted the premium for meanness. It hired a gang of snow-shovelers at $1 per day and board, then ran them off the track in the woods, kept them 24 hours without anything to eat, and refused to pay them for that day because they could not work.

Eight-Wheel Street Cars.

There are now running on the Broadway Railroad in Brooklyn, N. Y., a number of eight-wheel cars of a new pattern, made by J. G. Brill & Co., of Philadelphia. These cars seat 40 persons and are 26 ft. long and 7 ft. 3 in. wide over all. They are carried upon two four-wheel swing-motion trucks, so made that the car-body sets very low, and the steps are not more difficult than those of an ordinary four-wheel car. They weigh about 9,000 lbs. each, and are said to run much more smoothly and to pass curves more easily than the ordinary cars. They are handsomely finished, well lighted with four lamps, and provided with Spear's heaters. The Broadway road is run for part of its length by horses and for the rest by Baldwin steam motors.

One-Hundred-Mile Tickets.

The Chicago & Iowa Railroad, which is about 80 miles long, has recently issued a ticket good for 100 miles of travel anywhere on the road. It has 20 coupons, each for five miles, and the whole is sold for three dollars, which is a considerable reduction from the local fares. The following conditions, signed by M. L. Ettinger, General Ticket Agent of the road, have been made with regard to the use of these tickets:

"Conductors will take up one coupon for each five miles traveled, or for any ride less than five miles.

"All excess miles over five or multiples of five will be cancelled by punching out such excess in margin of highest numbered coupons.

"This ticket will be void if transferred or used by any other person than the signer, and taken up and fare collected.

"Passengers using this ticket on freight trains assume all risks for any loss or injury to his person or property.

"The signer or holder of the ticket must agree to sign his or her name at any time when requested by any conductor, for the purpose of testing the right of the party using this ticket on any train.

"No stop-over issued on the ticket.

"Usual amount of baggage carried on the ticket.

"The ticket must be surrendered to the conductor when the last coupon is used.

"The erasure of any condition will void the ticket."

Remedies for Burns and Cuts.

Mr. S. E. Sturdevant, of the New York, Lake Erie & Western, writes us as follows: "Locomotive engineers would be benefited much if they knew that the common black oil used on most roads, if applied immediately, will take the fire out of a 'cinder-burn.' I have caught a hot cinder in the corner of my eye and immediately applied our oil, and although a bad burn, no scab was ever raised, but in a few minutes the pain had all disappeared."

We infer that our correspondent means that the oil should be applied externally to the skin and not be put into the eye, which would be a dangerous experiment.

While on this subject, we copy the following paragraphs from the Louisville *Medical News:*

"A venerable patient, a retired foundryman, tells us that during his apprenticehood to a ship-builder of Philadelphia he became acquainted with a never-failing remedy for burns and scalds, and that in his subsequent foundry life he saw innumerable such injuries relieved of pain, and healed as if by magic, by powdered charcoal. The softer it is the better, and that from pine-wood is the best. It is to be thickly sprinkled over the burnt or scalded surface as soon as possible, and renewed as it becomes moist or drops off.

"The same patient states that in the ship-yard and in his foundry fir balsam proved a most soothing and rapidly curative dressing for abrasions and cuts. The hurts heal with marvelous expedition, and suppuration, erysipelas, etc., are always prevented, he says. The balsam should be spread thickly over the wound.

"No doubt the disciples of antiseptic surgery would attribute the good results of this dressing to the disinfectant power of the balsam, but the secret of its efficacy lies no doubt in its exclusion of the atmosphere from the wound. Nature endeavors to keep out the air from wounds by means of a film of lymph or pus, or a scab, and meddlesome man thwarts nature by frequent 'cleansing' the hurt by water; or, worse still, soap and water. The balsam protects the sore from air and water, and nature unobstructed does her healing work rapidly and well."

Doubtless this is the explanation of the salutary effect of black oil applied to a burn. Every pattern-maker is familiar with the use of shellac varnish to cuts and abrasions of the skin, the beneficial effect of which is no doubt due, as in all such applications, to the fact that it excludes the air. Molasses, flour and water applied to burns have the same effect.

On Brakes in the Senate—A Preposterous Story.

"A jocular senator from the West," according to the Washington correspondent of the Boston *Journal*, "tells a very good story about another senator from a Southern state. The latter began life as a brakeman on a railroad, and by industry and foresight has accumulated a fortune and high political honors. Senator Thurman, while speaking, usually holds his eye-glasses in one hand and a huge red handkerchief in the other. He blows a sounding blast on his nasal organ in the midst of a speech quite as naturally as Senator Dawes looks up at the galleries every time he addresses the Vice-President. It was an all-night session. The silver bill was under discussion. The Southern senator referred to was quietly sleeping on a sofa in the cloak-room. Mr. Thurman was speaking. He blew his nose with such vigor that the report could almost have been heard in the Secretary's office. The sleeping senator was awakened by the noise, and, leaping to his feet, grasped a chair by the side of the sofa and twisted it around until the author of the story grasped him by the arm and brought him to a realizing sense of his whereabouts."

Strength of American Railroad Cars.

On the 23d of October, 1878, a southeasterly gale prevailed in the Middle States, which was very severe at Philadelphia.

The anemometer of the signal service recorded a velocity of the wind of 75 miles an hour. Several steeples were blown down, and several hundred houses unroofed and otherwise seriously damaged.

Among the structures thus injured was the depot of the Pennsylvania Railroad, West Philadelphia. It consisted principally of a main building, for waiting-rooms and offices, and two sheds, each 70 feet in width, and about 800 feet in length, extending northward from the main building, and on the side of the hill bounding the Schuylkill on the west. Immediately east of the depot, and about 25 feet below, are the tracks of the Junction Railroad. From its situation, the eastern shed was greatly exposed to an easterly storm. During the gale of Oct. 23, about 7 o'clock a. m., the shed was blown over upon several trains of cars, which were under it, ready to be dispatched.

So great was the strength of these cars, that they held up the wreck. The 10-in. cast-iron columns, 25 ft. long, that supported the roof-girders, fell, in many cases, directly against the cars with the force due to their own weight and that of the whole roof, probably at least 6 tons to each column, impelled by the force of the wind added to that of gravity.

Notwithstanding this, not one of the cars was wrecked. In one instance a column struck a car near the middle, and snapped off, but the frame work of the car was not broken; the lower part of the column rested against the car—the upper part on its roof.

It has been frequently remarked that in railroad accidents in England, the fatality and wounding are greater than in the United States, owing to the fact that the English cars are not built to stand any extraordinary blow, and in the event of a collision or derailment the cars are splintered to a greater extent than in this country; but it is so rare that a test like the above occurs, that we think it worthy of a permanent record.

A car that will stand, without injury, the impact of a 10-in. cast-iron column, with 6 tons of extra weight, driven by a gale of 75 miles an hour, contains an excess of strength that is very assuring to the traveler.—*Journal of the Franklin Institute.*

Finding a Seat.

Genesee. A woman with a three bird cages and a little girl, has just got on the train. She arranges the three bird cages on a seat, and then she and the little girl stand up in the aisle and she glares around upon the ungallant men who remain glued to their seats and look dreamily out of the window. I bend my face down to the tablet and write furiously, for I feel her eyes fastened upon me. Somehow or other I am always the victim in cases of this delicate nature. Just as I expected. She speaks, fastening her commanding gaze upon me.

"Sir, would it be asking too much if I begged you to let myself and my little girl have that seat? A gentleman can always find a seat so much more easily than a lady."

And she smiled. Not the charmingest kind of a smile. It was too triumphant to be very pleasing. Of course I surrendered. I said:

"Oh, certainly, certainly. I could find another seat without any trouble."

She thanked me and I crawled out of my comfortable seat, and gathered up my overcoat, my manuscript, my shawl-strap package, my valise and my overshoes, and she and the little girl went into the vacant premises as soon as the writ of ejectment had been served, and they looked happy and comfortable.

Then I stepped across the aisle; I took up those bird-cages and set them along on top of the coal box, and sat down on the seat thus vacated. I apologetically remarked to the woman, who was gazing at me with an expression that boded trouble, that "it was much warmer for the canaries up by the stove." She didn't say anything, but she gave me a look that made it much warmer for me, for about five minutes, than the stove can make it for the canaries. I don't believe she likes me, and I am uncomfortably confident that she disapproves of my conduct.—*Correspondence Burlington Hawkeye.*

A New Steam Excavator.

The American Machine Co., of Boston, is now building new steam excavators, one of which is in operation at its works, and is thus described: "The important feature of this machine is the patent grappling shovel, invented by Mr. George Souther. This shovel descends perpendicularly, and is attached to the lower end of two parallel iron tubes, capable of withstanding a downward pressure, jointly, of thirteen tons. The shovel opens at the bottom more than twice its width. It is held firmly to the bottom of the ditch by the iron tubes before mentioned, and, by a powerful purchase, the jaws of the shovel are embedded in the earth sufficiently to completely fill is when closed. It is then raised to the necessary height, swung to one side, and the contents dumped into cars, which convey the material away.

"The capacity of this machine, which weighs about 10 tons, is one-half cubic yard at each grapple. A larger size machine, weighing about 26 tons, designed for railroad and other heavy work, uses a one and one-half or two-yard shovel. In addition to their excavating qualities, by an ingenious device they are so arranged as to furnish their own propelling power, and, when fitted for railroad use, can be shifted from one locality to another with great facility. * *

"The shovel, opening as it does from the bottom, and being forced down when in the act of closing, by means of a chain attached at the top of the tubes, in connection with a rigid crane, power can be applied as required to meet the variation in the hardness of material. The tubes, at their connection with the shovel, are hinged, thereby allowing the shovel to conform with any unevenness of the surface operated upon, and preventing any undue strain upon the tubes, whereby they might become bent or broken. It will be seen by this that no dependence whatever is placed upon the weight of the shovel in filling, nor does the hoisting power lift the scrapers in closing, as is the case with all other grappling shovels."

Safety Switch Lock.

The Fort Wayne Railroad is fitting out its line with a very ingenious switch lock which greatly lessens the probabilities of a switch being left open by a careless or hurried employé. With the new lock, it is impossible for the conductor or brakeman to withdraw his key until the lock has been fastened. Besides, another device and arrangement of figures enables it to be ascertained just who was at the lock last.—*Pittsburgh Telegraph.*

A Boston Ticket Scalper.

The Boston *Herald* of Jan. 16 says: "Some months ago the managers of the roads running into Boston became convinced that tickets were being sold in this city by ticket brokers, said tickets having been furnished them by persons who obtained them dishonestly. About the 1st of August the matter was placed in the hands of the state police. Upon investigation it was found that several brokers were selling tickets in Boston at a price less than the roads could sell. Among them was Mr. W. E. Sheldon, of No. 260 Washington street, who was by far the largest dealer. In order to ascertain how the business was conducted, the managers of some of the roads expended several hundred dollars in the purchase of tickets. Soon after the investigation commenced it became impossible to purchase from anybody but Sheldon, who, to all appearance, was doing a lucrative business. Matters having progressed thus far, it was decided to take out a search-warrant and make an examination of Sheldon's office. The warrant was sworn out by a manager of one of the roads and placed in the hands of Detectives Knox, Innis and Philbrick. They proceeded to the premises occupied by Mr. Sheldon, and after careful search discovered a number of tickets on nearly every road in New England, and some on the Western roads. Sheldon was requested to accompany the officers to police headquarters, where he was met by a number of railroad managers, who were present by request of Chief Clemence. Upon being closely questioned as to how the tickets came into his possession, Mr. Sheldon said he did not know. He finally informed the officers that the man from whom the largest number had been obtained lived in Nashua, N. H., and, although his name was not known to him, he offered to accompany an officer to New Hampshire for the purpose of showing him the man. Detective Philbrick was detailed to

accompany him, and the two left for New Hampshire last night. Although the officers were satisfied that some of the tickets had been stolen, the number belonging to each road was so small that the railroad officials decided to await further developments. The matter has not been dropped, however, and active measures are to be taken to ascertain who the parties are who have been furnishing Mr. Sheldon and the other dealers with the tickets."

Outrunning a Train.

Jim Wyatt glories in the ownership of a horse that can beat the Central Railroad's best schedule time. Last Friday night he mounted a negro on the animal in question and sent him to Lovejoy on an errand. Returning, he was overtaken by the eleven o'clock through freight, which so frightened the horse that he became perfectly wild, and, throwing his rider, struck out down the railroad track like a streak of greased lightning, with the rapidly-advancing train close upon his heels. The engineer sounded the alarm whistle, opened the steam-cocks, and did everything else to frighten the already terrified animal from the track, but failed. He then pulled the throttle wide open, thinking to overtake and knock him off; but Pegasus gathered fresh strength as the object of his terror approached, and, letting himself out, soon left the locomotive far in the rear. The race continued until Sunny Side was reached, when he left the track, having run the entire distance (nearly nine miles) in less than forty minutes, and beating the train by several car lengths. This statement, incredible as it may seem, is actually true, and will be vouched for by reliable witnesses, the engineer amoung the number.—*Henry County (Ga.) Weekly.*

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.—The switch-back or temporary track over the Raton Mountain at the New Mexico line, which this company is now operating, is 2.7 miles long, although the two ends or connections with the permanent track are but 3,600 feet apart. The tunnel through the mountain, on which work is in progress, will be 2,010 feet long. The switch-back track has a maximum grade of 6 per cent., or 316.8 feet to the mile, and the shortest curve is 16 degrees, or 358 feet radius. A special engine has been built for use at this point, of Consolidation pattern, with 20 by 26 inch cylinders and a heavy saddle-tank. Until the arrival of this engine, however, the ordinary freight engines of the road, with 17 by 24 inch cylinders, are used, and take over at a trip two cars loaded with ties or iron. The big engine has probably been received by this time.

Atlantic & Great Western.—In the Supreme Court at Buffalo, N. Y., Jan. 16, in the foreclosure suit of Sayles and Dunphy, trustees, against this road, Judge Daniels gave a decision, setting aside the claim of the Banque Franco-Egyptienne to preference, as holder of certain second-mortgage bonds. The Judge held that the bonds issued by the present company to the creditors of the preceding company were lawful obligations, and fully secured by the mortgage.

Atlantic, Mississippi & Ohio.—On the hearing in the foreclosure suit before the United States Circuit Court in Richmond, Va., on Jan. 16, the Court decided not to hear argument on the motion for a decree of foreclosure and sale until it had passed upon the various exceptions filed, which could not be done that day. Further the court was of opinion and would declare that the pledged bonds in the hands of holders were good for their face value, and when redeemed by the Receiver would be assets for the amount paid by the holders for said bonds. The Court gave counsel two weeks to present arguments on the decree, to which time the case was adjourned.

Boston, Clinton, Fitchburg & New Bedford.—The reported negotiation of a lease of this road to the Old Colony Company is confirmed, and the contract is to be submitted to the stockholders of the two companies for ratification. The lease is for 999 years and the rental is to be 10½ per cent. of the gross earnings of the joint roads The company owns a line from Fitchburg, Mass., to New Bedford, 91.02 miles, with 34.31 miles of branches, and leases the Framingham & Lowell road, 26.12 miles, making 151.45 miles in all. This, added to the Old Colony's previous mileage, will give it 459.08 miles, the greatest length under one management in Massachusetts. The lease will complete the Old Colony's control of the traffic of all that section of Massachusetts to the eastward of the Boston & Providence road, and in addition will give it branches to Fitchburg and Lowell, which may be profitably used to bring business to its steamboat line to New York. It is understood that an existing contract for division of certain business with the Boston & Providence will continue in force.

The Boston, Clinton, Fitchburg & New Bedford has been built up by the consolidation of several short roads and has had a somewhat checkered history. It has a bonded debt of $3,169,100, on which the annual charge is $206,960, and a floating debt of about $850,000. The earnings of the two roads last year were as follows:

	Old Colony.	B., C., F. & N. B.	Total.
Gross earnings	$2,103,462	$970,548	$3,074,010
Expenses	1,374,338	683,917	2,058,255
Net earnings	$729,124	$286,631	$1,015,755

Had the lease been in force for that year the 10¾ per cent. of the joint earnings would have been $327,894.40, or $41,263 more than the net earnings of the leased road actually were. The Old Colony, however, can doubtless make a considerable saving in cost of management and working, and will probably clear itself on the lease. On the other hand it will be a good thing for the owners of the leased road, and will doubtless improve the price of their securities, as the Old Colony's credit is of the best, and that of the leased road has been somewhat impaired, though it is better now.

Boston Elevated.—It is proposed to build an elevated railroad in Boston, not for passengers, but for freight traffic. The Boston *Advertiser* says: "The purpose is to connect the South Boston flats with the Fitchburg, Boston & Lowell, Eastern and Boston & Maine roads by a double-track elevated road through Prince and Commercial streets and Atlantic avenue, crossing Fort Point channel at Oliver street, the railway to join with the city in the building of the bridge across from Oliver street, which it will be obliged, by its contract with the state, to do the coming summer, when the New England Railway has put this land into actual service. From the calculations that have been made from the maps in the city surveyor's office it is certain that the whole line will be very close to a mile and a quarter long, and, taking the assessors' valuation as two-thirds of the market value of the property which it may be necessary to buy to secure rights of way, the outside of the prospective cost, including terminal switches and engines, will be inside one million dollars. * *

"With a double-tracked elevated road skirting so much of the best wharfage of Boston proper, the development of these estates for foreign sail-tonnage will be immense. The warehouses on each wharf will have switches running along their second stories to accommodate a business which this road will cater for. The ability of this road to handle freight will be unlimited, as fast trains from either termini can be run steadily."

Boston & Northwestern Junction.—This is the latest plan to connect the lines entering Boston with the South Boston flats. The projected line is to leave the Fitchburg road at Stony Brook, cross the Boston & Albany at Newton, the Woonsocket Division of the New York & New England in Brookline, and reach the main line of that road at Mount Bowdoin Station, whence trains can run upon that track to the flats. The plan is to have each road build its share of the connection and take pay in stock of the company.

Bridgeton & Port Norris.—The bondholders, who lately bought this road at foreclosure sale, have organized the Cumberland & Maurice River Railroad Company. The new company will issue $250,000 stock, to be divided among the old bondholders, and $50,000 bonds, to be sold for the purpose of putting the road in good order and buying equipment. The line extends from Bridgeton, N. J., to Bay Side View, 20½ miles; the old bonded debt was $400,000.

Burlington & Missouri River in Nebraska.—Land Commissioner A. E. Touzalin furnishes the following statement of sales of land belonging to this company for 1878:

	Acres.	Amount.
South Platte lands, lying within 20 miles of the road	391,930.33	$2,289,872.85
North Platte lands, distant from road and lying from 20 to 50 miles north of Union Pacific	122,167.76	330,638.05
Total	514,098.12	$2,620,510.90

Of these sales, 251,026 acres for $1,209,454 were sold for cash or on short credits, while 263,072.12 acres for $1,411,056.90 were sold on ten years' time.

Central Pacific.—In the United States Supreme Court, Jan. 16, the case of Gallatin against this company came up for argument. The suit was brought in the Circuit Court for California by Albert Gallatin, a stockholder of the company, for the alleged purpose of compelling the company to comply with the sinking-fund law passed at the last session of Congress. The Circuit Court decided against the company and an appeal was taken. The Attorney General now moves to dismiss the suit on the ground that it was brought by collusion between the parties and by procurement of the company, in order to forestall a similar suit known to be contemplated by the government.

Chicago, Burlington & Quincy.—The chief of telegraph for the Chicago Division, Mr. George E. Simpson, reports that from Aurora (where the easternmost branches join the main line) to Chicago there passed in 1878, 5,895 freight trains with 204,041 cars, of which 63,200 were loaded with live stock. This was an average of 16.14 trains per day and 586.4 cars, and the average number of cars per train was 34.61. On the Fox River Valley Branch from Streator to Aurora (traffic chiefly coal), there were 1,124 trains in the year, with 25,100 cars—an average of 3.79 trains and 79.42 cars per day and of 22.33 cars per train. The freight trains from Aurora to Chicago if placed in line would have reached nearly 1,275 miles.

Chicago & Pacific.—Receiver Whitman reports for October, November and December as follows:

Balance, Oct. 1	$14,472.53
Receipts from all sources	53,922.26
Total	$68,394.79
Disbursements	56,644.24
Balance, Jan. 1, 1879	$11,750.55

The disbursements were $2,721.98 greater than the receipts. Payments included $361.12 on old debts of the company, and $5,709 on account of new stock cars.

Chicago & Northwestern.—This company has decided to print all its coupon tickets hereafter in accordance with the principles covered by the Davis patent ticket, believing that to be the safest, simplest and most complete form. In order to make the new issues as complete as possible, General Ticket Agent Thrall has issued a circular requesting all connecting lines to furnish him with full information, as to proper name of road, different lines worked, omnibus or ferry transfers required, and any local limitations that may be desired.

Chicago, Pekin & Southwestern.—Receiver Hinckley reports as follows for thirteen months from Nov. 1, 1877, to Nov. 30, 1878:

Balance Nov. 1, 1877	$45
Receipts since	316,396
Total	$316,441
Disbursements	284,624
Balance, Dec. 1, 1878	$31,817

Of this balance $25,000 is on deposit with the Farmers' Loan & Trust Company, anticipating the payment of the interest on the first-mortgage bonds, due Feb. 1, 1879, and the balance is on deposit with the First National Bank of Chicago, to provide for December pay-rolls and audited accounts. Of the disbursements $40,191 is marked as paid to the railroad company, but no particulars are given as to what items this comprises. All bills contracted by the Receiver have been paid, and no debts have been contracted except for current operating expenses. Default was made in the payment of interest on the first mortgage bonds Aug. 1, 1877, and the Receiver took charge before that. Afterward the Farmers' Loan & Trust Company filed a bill to foreclose, and he was re-appointed. Negotiations for a reduction of interest and a compromise with the first mortgage bondholders were made, and a compromise effected by which they agreed to cancel three coupons for about $120,000; to reduce the interest from 8 to 7 per cent.; and the bondholders also agreed to assess themselves 10 per cent. on the bonds held by them respectively, making a fund of $100,000 in all, which was paid to the Farmers' Loan & Trust Company, to be disbursed for new equipment. New cars, etc., were then purchased, and the title taken in the name of a committee of bondholders, consisting of Moses Taylor, Lucius Tuckerman and A. F. Higgins; but the rolling stock was placed on the road and is now in use. In order to do this, it was agreed to pay the reduced interest promptly, and the receiver needs $10,000 more to meet the $35,000 of February interest. No interest has ever been paid on the second-mortgage bonds, and no effort made to foreclose the mortgage. Since his appointment, the Receiver says he has greatly reduced the floating indebtedness, partly by advantageous compromises, but there are some large claims still due. The largest is that for $10,000 in favor of the Chicago, Burlington & Quincy Railroad Company. When the Receiver took possession, the company was using a large number of cars under a contract with an English company, for which they were paying at the rate of 14 per cent. interest on the price. The Receiver has made a new contract at 8 per cent. and is paying the amount in monthly payments. About $22,000 has already been paid, and he hopes to be able to pay the remainder. The taxes of 1873 and 1874 are still unpaid, owing to some litigation over the tax on capital stock.

Cincinnati, Rockport & Southwestern.—This road is reported as doing a good business for a short road, and is expected to do much better when opened through to Jasper, Ind., where it will reach good and abundant coal, which is much needed at the southern terminus, Rockport, on the Ohio. The annual interest charge on the 40 miles of road will be only $18,000, and it is expected that the road will earn that amount at least.

Dahlonega & Atlanta.—Surveys have been begun for the projected road which is to run from Dahlonega, Ga., southeast to Gainesville, on the Atlanta & Charlotte Air Line. The distance is about 25 miles.

East River Bridge.—The New York Supreme Court, at General Term, has reversed the decision of the Special Term, and ordered that a *mandamus* be granted to require the Comptroller of the city of New York to issue bonds and pay over the money for which requisition has been made by the bridge trustees.

Glencoe, Pinconning & Lake Shore.—This Michigan lumber road, since the failure of Campbell & Co., its former owners, has been in possession of the Commercial Bank of Canada. A branch from Pinconning, Mich., northwest into the woods is now nearly finished for six miles, and is being graded for six miles further.

Grand Haven.—It is proposed to extend this road (the old Michigan Lake Shore) on the west to Grand Haven, Mich., and on the east to Toledo, O. Eastward to Toledo a line is proposed, following the general direction of the Lake Shore & Michigan Southern Railroad to Abronia, and between that line and the Monteith road, crossing the Grand Rapids & Indiana Railroad in Gun Plains, about three miles north of Plainwell, keeping west of Cressy's Corner, to Rickland and Yorkville, and crossing the Kalamazoo River and the Chicago & Lake Huron Railroad nearly south of Pennfield township, the Michigan Central Railroad at Marshall, and then, in almost an air-line, to Hudson, through Homer, Mosherville and North Adams. From Hudson the line will probably pass through Morenci on the Chicago & Canada Southern Railroad into Ohio and on to Toledo.

Illinois Central.—The statement is confirmed that this company and the Wabash have been unable to agree upon terms for the formation of a Chicago-St. Louis line by the two roads. It is understood that this company is determined to build a branch to East St. Louis, should the Wabash make one to Chicago. Further negotiations are said to be probable, however.

Superintendent Jeffrey has issued the following circular to employés, giving them instructions to prevent loss or damage by fire: "All officers and employés must take every precaution to prevent loss or damage by fire. At the repair shops the employés must be regularly drilled in the use of appliances for extinguishing fires. Chimneys, stove-pipes, smoke-jacks, and similar arrangements, must be kept in thorough order. Engineers must know that the stacks and ash-pans of their engines are in good condition so that fires will not be started along the right of way. Train-men must exercise care in keeping up fires on passenger trains and in caboose-cars, and promptly report defects in heating apparatus. Agents must know that stoves, pipes, chimneys, etc., are in safe condition, and promptly report necessary repairs. Section foremen and men must keep a sharp lookout and promptly extinguish fires on right of way. They must use good judgment in burning grass and weeds, so that fences and neighboring property will not be injured. Constant vigilance is necessary on the part of all."

Kansas Pacific.—In the cases recently argued the United States Circuit Court has given its decision and retains jurisdiction in the foreclosure suits, refusing the application to remand them to the state courts. The bondholders are confirmed in their right to remove the trustees while the litigation is in progress. Counsel for certain bondholders are also granted leave to intervene in the suit, for the purpose of testing the validity of the funding mortgages.

Logansport, Crawfordsville & Southwestern.—An Indianapolis dispatch says that in the foreclosure suit, the United States Circuit Court has decided that the expenditures made by the Receiver are a lien on the property prior to that of the first-mortgage bonds.

A later dispatch says: "The particular question involved was whether the expenditures made by the Receiver formed a lien prior to that of the first-mortgage bonds. In this case, the second-mortgage boudholders had sued to a foreclosure, and a receiver was appointed to take charge of the trust, pending a final disposition to the case. The first-mortgage bondholders were not made a party to the suit, and, when the Receiver's bills came in, filed objections to their payment. Judge Drummond stated, as chancellor of a court having railroad property in its custody, that in an exceptional case he would have power to direct the building of a link, branch or extension of the road, which would make it a valuable property, where, in its unfinished state, it was not, and charge the expense to the first-mortgage bondholders, although they were not a party to the suit and protesting against the improvement. In this case the Receiver built a branch road six or seven miles in length under order of the court, and the expense was charged to the first-mortgage bondholders. He also purchased engines and rolling-stock, and improved the road-bed, all of which the court held must be paid for before the lien of the first mortgage was satisfied."

Mackinaw & Marquette.—At a meeting of the directors of the Marquette, Sault Ste. Marie & Mackinaw Company, which holds the contract from the state of Michigan to build this road, held at Marquette, Mich., Jan. 9, a resolution was adopted annulling the contract with Dr. W. W. Leman, for building the road, on account of non-compliance with its provisions, after which the following preamble and resolutions were adopted:

Whereas, A contract for constructing a railroad from the Straits of Mackinaw to Marquette, dated May 8, 1876, in accordance with the provisions of the act of the Legislature of this state, approved March 21, 1873, authorizing a grant of state swamp lands to aid in the construction of such road, and several amendments of said act, was executed between the Board of Control of state swamp lands and this company: and

Whereas, This company has expended the sum of $20,000 in making a preliminary survey of the line of said road, and in making minutes, maps and profiles of said survey, besides other considerable sums of money in promoting the construction of the road; and

Whereas, The party with whom we contracted to furnish the capital and build said road has failed to commence and prosecute the work as required by said contract, and said contract has been by us declared forfeited; and

Whereas, we have no object to serve, or end in view, but to procure the construction of the railroad for which said grant was made, and are now, as we always have been, ready and willing to confer all the benefits of said contract and

land grant upon any parties giving reasonable assurance of commencing and completing said work within a reasonable time, so as to save the said land grant, asking for and expecting no benefit therefrom except such as we may enjoy in common with all our fellow citizens from the completion of a public work of the magnitude and importance of this road; therefore,

Resolved, That we invite the attention of capitalists, particularly of our own state, to the munificent land grant of over 1,000,000 acres offered by the Legislature of this state to aid in the construction of this road, and to the work itself as one of the utmost importance to the whole state, and we hereby propose to transfer to any company or individuals (with the consent of the Board of Control), all the benefits to be derived from our said contract with the said Board of Control, upon assurance that such persons or company will, within a reasonable time, commence and diligently prosecute to completion the construction of said contract, either through the corporate organization already organized by us, or through such new association as they may form.

Resolved, That in case of the acceptance of this proposition by such company or parties, or of their undertaking to build said road under said land grant, we are willing to submit to the Board of Control whether or not such company or parties shall re-imburse us for the outlay we have made for survey, plans and profiles, and what sum, if any, they shall pay us therefor, and for such sum we propose to turn over all minutes, plans and profiles of said survey to said contracting parties.

Macon & Brunswick.—This road is now running double daily passenger trains, one running through to Brunswick, where it connects with steamboats for Fernandina, making the "Cumberland Route" to Florida. The other train runs between Macon and Jesup, connecting there with the Florida Express on the Atlantic & Gulf road.

Manchester & Keene.—Arrangements have been completed under which this new road will be operated for the present by the Connecticut River Company. It is expected that trains will be put on about Feb. 1.

Milwaukee & Dubuque.—At the recent annual meeting a number of gentlemen from Pennsylvania were chosen directors, and it is stated that they have taken a large interest in the company and will furnish money to build the road. It is said that work will be begun early in the spring. The road is to be run from Milwaukee to the Mississippi River opposite Dubuque, Ia., some 150 miles. The company owns 35 miles of road-bed between Milwaukee and East Troy, graded many years ago by the old Milwaukee & Beloit Company.

Milwaukee, Lake Shore & Western.—This company last year began to build several long sidings or spur tracks in Appleton, Wis., for the purpose of reaching the mills and manufactories along the river there. Several thousand feet of track have been laid on these sidings, and the work is to be continued this season.

During the past year the company received 23,292 tons of freight at Appleton, and forwarded 14,392 tons from that place.

Minneapolis & Dakota Northern.—This company has been organized to build a narrow-gauge road from the Northern Pacific at Moorhead or Glyndon, Minn., across tha Red River and thence down the Dakota side of that stream to the Manitoba line, about 150 miles in all. The more immediate object is to build the 40 miles from Moorhead to Grand Forks.

New York, Lake Erie & Western.—At a meeting of the board, held Jan. 16, proposals were received for the building of the two grain elevators in Jersey City, and referred to a committee for examination. One of the elevators is to have a capacity of 1,000,000, the other of 1,500,000 bushels. They are part of the projected improvements in the freight terminus at Jersey City, which include extensive warehouses for receiving, storing and shipping freight, and a large dock or basin where vessels can be loaded.

New York & Oswego Midland.—The running of trains on the 29 miles of the Auburn Branch between Norwich, N. Y., and De Ruyter has been abandoned, and will probably not be renewed. This branch is now very much in need of repairs, and the traffic over it is so light that the Receivers do not feel warranted in spending the money to put it in order. There is much feeling in the towns along the line, which were heavily bonded in aid of the branch.

The 19 miles between De Ruyter and Cortland are leased to the Utica, Ithaca & Elmira Company, and have been kept in order and worked regularly.

North Carolina State Railroad Securities.—According to the report of the State Treasurer, North Carolina holds railroad stocks and bonds as follows, the face value being given:

Stocks:	
North Carolina Railroad	$3,000,200
Atlantic & North Carolina	1,266,500
Western, of North Carolina	1,100,000
Albemarle & Chesapeake Canal	450,000
Roanoke Navigation Co	50,000
Total stocks	$5,866,700
Bonds:	
Raleigh & Gaston	20,000
Wilmington, Charlotte & Rutherford, now Carolina Central	1,500,000
Total bonds	$1,520,000

This does not include stocks bought with what are known as the special tax bonds. The Raleigh & Gaston bonds are good and the North Carolina Railroad stock receives 6 per cent. dividends, but the other stocks and bonds bring in no income whatever, and have only a nominal value. The state also owns the Western North Carolina road in fee, so that it is a large holder of railroad property.

Painesville, Youngstown & Pittsburgh.—This company has filed articles of incorporation in Ohio for a railroad from Youngstown southeast to the Pennsylvania line. The object, apparently, is to connect the Painesville & Youngstown with the Pittsburgh, New Castle & Lake Erie, and to complete the latter company's line to Youngstown.

Paris & Danville.—The engine-house of this road at Danville, Ill., was burned down Jan. 15, and three engines in it were badly damaged. The loss is estimated at $20,000, and there was an insurance of $15,000 on the property.

St. Louis, Alton & Terre Haute.—Notice it given that coupons on the second-mortgage preferred bonds, Series C, which became due Aug. 1, 1878, will be paid on and after Jan. 20 by the Third National Bank, New York, in accordance with the order of the Court.

St. Louis & Southeastern.—Meetings have been held in Evansville, Ind., to urge an issue of bonds by the city in aid of an extension of this road from Evansville along the Ohio River 10 miles to a point opposite Hendersonville, Ky. The new line will be built by a separate corporation, but will be used by this road to avoid the steamboat transfer of 11 miles from Evansville to Hendersonville, which is now necessary.

Searcy Branch.—This road was originally a wooden tramway extending from the corporate limits of the town of Searcy, Ark., to Kensett on the St. Louis, Iron Mountain & Southern road, a distance of about four miles. A little over a year ago it was bought by W. A. Yarssell & Brother, who laid it with 20-lb. iron rails, and extended it one-quarter of a mile into the town of Searcy. They have since extended it in the other direction to West Point, 3½ miles below Kensett, making it 7¾ miles long. All but one-quarter of a mile of the last extension is completed, and that section will be done very soon. The road is of 5-feet gauge, and cost about $4,000 per mile; at present it is operated by horse-power.

Southern Minnesota.—This company every year awards premiums to the locomotive engineers who have killed the least number of stock, and to the section foremen who have shown the best results on track repairs during the year. The engineers' premiums for 1878 were given as follows: James McLinden, $50; J. D. Brown, $50; O. Holmes, $40. The premiums for section foremen were: Iver Johnson, section No. 9, $50; Thomas Shea, No. 4, $25; Matt. Olssen, No. 5, $25; J. J. Smith, No. 20, $25.

Toledo, Peoria & Warsaw.—Receiver Hopkins reports as follows for November and December:

Balance, Nov. 1		$124,957.99
Receipts for November		130,241.52
" December		131,547.01
Total		$386,746.52
Disbursements for November	$131,047.80	
" December	248,570.32	
		379,618.12
Balance, Jan. 1		$7,128.40

Disbursements exceeded the receipts by $806.28 in November, and by $117,023.31 in December, making an excess of disbursements of $117,829.59 for the two months.

Troy & Greenfield.—In Boston, Jan. 21, the old Troy & Greenfield Company filed a bill in equity in the Supreme Court for the redemption of its road, now in possession of the state of Massachusetts. The company claims that the act of 1862, under which the state took possession of the road, including the Hoosac Tunnel, constitutes a contract, by the terms of which the right of redemption was reserved to the company until 10 years after the completion of the tunnel and a limitation made of the expenditures chargeable to the company to $2,000,000. The company therefore claims that the contract, having been duly accepted by its stockholders, is binding upon the state, and asks a decree returning the road to it upon payment of the sum of $2,000,000.

If the contract is sustained as claimed, the company will have a pretty good bargain, for the road has cost the state nine times the amount named. It is not denied, we believe, that the right of redemption exists, but the present claim will doubtless be contested, and the state will not agree to surrender the property unless repaid its actual expenditures thereon.

Union Pacific.—A dispatch from Boston, Jan. 20, says: "A suit at law and one in equity are now pending before the courts of this state, growing out of the transactions between the Credit Mobilier and the Union Pacific, and to-day a question was raised before Judge Soule, in the equity session of the Supreme Court, and decision thereon obtained. In July, 1875, the Credit Mobilier brought a suit in this court against the Union Pacific and recovered upon a promissory note $2,000,000, given by the latter Aug. 4, 1869. The Union Pacific then brought a bill in equity to restrain the collection of the note. This bill was set down for final hearing to-day, but Jay Gould, now President of the Credit Mobilier, and certain directors constituting the Executive Committee of that company, recently ordered a discontinuance of the action on the note.

"The largest part of the stock in the Credit Mobilier is held by the Union Pacific, and certain stockholders of the Credit Mobilier, including the executors of the estate of Oakes Ames, and a savings bank in Connecticut, petitioned for leave to come in and be made parties to the writ in equity, and asked that they might prosecute the suit at law and that the two corporations might be enjoined from settling the controversy. These stockholders state that they represent between 5,000 and 6,000 shares, and claim that Jay Gould and others are endeavoring to defraud them of their rights. They also pray that the judgment against the Union Pacific on the note for $2,000,000 be enforced. After a brief hearing on this point of enjoining the companies from settling, Judge Soule issued an order of notice, returnable on the first Monday in March, and a temporary injunction against the settlement of the suits. Thornton J. Lothrop appeared for the petitioners. A similar injunction has been obtained from the courts of Pennsylvania."

Utah Southern.—It has been decided that this company shall build 30 miles of the new southern extension, to Chicken Creek. A new company will be organized to build the road from that point south to Frisco.

Washington City, Virginia Midland & Great Southern.—A meeting of bondholders was held in Baltimore, Jan. 18, at which a statement was presented from the committee. Five bondholders were then selected as delegates to represent the Baltimore interest at the general meeting of bondholders, which was to be held in Richmond, Jan. 22.

Western Maryland.—A bill has been filed in the Baltimore County Circuit Court to foreclose the second preferred mortgage on this road. The complaint is signed by John A. Hambleton, O. C. Zehl and other bondholders, and, besides the usual obligations of default, charges that the company has spent money which should have been used to pay interest in building parks and hotels along the line. This action is taken on account of the refusal of the city of Baltimore to buy up the second-preferred bonds at 66⅔. The offer was made to the city, because it holds some $3,000,000 in securities junior to the second-preferred mortgage. The bonds issued under that mortgage amount to $600,000 and have only $777,011 first-mortgage bonds and funded coupons ahead of them, while there are $2,475,000 bonds issued under subsequent mortgages. It is still thought probable that the city will make some arrangement with the bondholders, and the suit will be withdrawn.

Wisconsin Valley.—This company has issued a circular to its bondholders setting forth its present position. The company has outstanding $1,754,000 first-mortgage bonds, $40,950 scrip receipts for bonds and $79,972.50 bonds agreed to be issued for coupons of Sept., 1, 1874, and March 1, 1875. The unpaid coupons from Sept. 1, 1875, to March 1, 1879, amount to $524,308.30, not including that of Sept. 1, 1878, which is now being paid in cash. The annual interest charge is $149,173.80; the net earnings last year were $66,018.34, and it is evident that the company cannot continue to carry its present load. It is therefore proposed that bondholders surrender all their present bonds and overdue coupons and receive one-half the amount of the bonds or $937,461.25 in new 7 per cent. bonds, and the other half and the coupons in 7 per cent. preferred stock, dividends not cumulative. There are included in the bonded debt, $61,000 bonds having a special lien on subsidies and lands given in aid of the extension from Grand Rapids to Wausau; for these it is proposed to give one-half the principal in the new first-mortgage bonds, the other half and the unpaid coupons in new income bonds. By this plan the company will have the present amount of common stock, $501,000; $1,411,989.55 preferred stock; $937,461.25 first-mortgage bonds, and $49,780 income bonds. The interest charge which must be paid will then be $65,622.29 per year, or less than the present net income.

This agreement can be carried out, if the bondholders all consent. In case they do not, those who assent to the plan are asked to sign an agreement constituting H. H. Hunnewell, N. Thayer, Jr., Francis Bartlett and Charles Merriam trustees to foreclose the mortgage, buy in the road and organize a new company which shall carry out the plan proposed.

ANNUAL REPORTS.

Illinois Central.

Part of the report of this company for the year ending Dec. 31, 1878, has been published, including the directors' report and the general balance sheet; the reports of the General Manager, Superintendent, etc., and the detailed tables of earnings and traffic will not be ready until later.

The general balance sheet is as follows:

Shares ($41,106 per mile)		$20,000,000.00
Funded debt:		
Six per cent. currency redemption bonds of 1890	$2,500,000	
Six per cent. sterling bonds of 1895	2,500,000	
Five per cent. sterling bonds of 1905	1,000,000	
Sterling sinking fund 5 per cents	4,393,000	
Seven per cent. construction bonds	4,000	
		10,397,000.00
Six per cent. currency bonds of 1898, secured by mortgage on Springfield Division		1,600,000.00
Balance surplus account		504,529.56
Balance income account		1,455,635.30
Insurance fund		53,727.66
Total		$43,010,892.52
Permanent expenditures, Illinois	$33,000,000.00	
" " Iowa	913,172.91	
Total	$33,913,172.91	
Springfield Division	1,600,000.00	
Working stock of supplies	303,865.92	
Chicago, St. Lo. & N. O. first-mortgage bonds, $1,087,000, costing	1,023,200.00	
Assets	820,199.38	
Investments New Orleans Line	5,296,726.65	
Assets in insurance fund	53,727.66	
		43,010,892.52

The sterling sinking-fund bonds were reduced $111,000 by the payment of that amount in 1878. The bonded debt, excluding Springfield Division bonds, was $14,737 per mile; on Springfield Division, $14,350 per mile.

The directors' report is as follows:

"The directors have the satisfaction to refer the shareholders to the general balance sheet of the 31st ultimo, and annexed abstracts, in which is shown a gain in net traffic over 1877 of $468,667.80. This improvement is chiefly owing to the better condition of the line, and its very economical management.

"The net return was, from traffic, $3,015,229.19, from lands, $64,118.45, and from interest on the investment in bonds secured by the first mortgage of the Chicago, St. Louis & New Orleans Railroad Company, $68,040, making the aggregate net income $3,147,387.64. From this fund the company has paid the interest on its bonds, and two dividends on its shares, with other expenses as detailed, leaving a balance of $665,532.11 for the year, which, added to $790,103.19 at credit of income account the previous year, makes $1,455,635.30 now carried forward at the credit of income account.

"The present is an opportune time to sift and reduce to an absolute cash valuation the company's assets, and thus $312,403.62 has been deducted from the surplus account. The board has also directed that $1,000,000 more be deducted, on the one side, from the surplus account, and, on the other, from the valuation of the property.

"A spur-road, 37 miles in length, running southwesterly from Otto, on the Chicago Division, has been built. In replacing iron rails in the main track with steel, the best of the old rails were selected and turned over to the new road at their market value. The track is laid and partly fenced; ballasting will be completed this spring. This spur will cost about $250,000, and will, without doubt, be profitable.

"Low tolls upon the Erie Canal and cheap freight by Lake, have drawn an immense volume of business to the lines of water transportation during the months of open navigation. The receipts of grain at Chicago in 1878 were 35,000,000 bushels in excess of those of any previous year. The early completion of the Welland Canal will further verify the expectations heretofore expressed in several of the reports of your board.

"It is perhaps well to refer briefly to the astonishing progress of the industries of Illinois. Chicago is already a great manufacturing centre, 70,000 operatives are employed, and the estimated value of manufactured products for 1878 is $238,000,000. It seems superfluous to repeat the obvious truth that wherever cheap fuel, cheap food and cheap transportation combine, *there* population will crowd in to manufacture for regions less favored by these economical conditions. The enormous coal fields of Illinois are being developed; the state is studded with factories, and the energy which has in twenty years made Illinois so conspicuous in the production of cattle and grain, is already showing itself in the distribution of its manufactures, not only to the adjacent and Southern states of the Union, but to Mexico and the West Indies.

"The New Orleans Line is greatly improved. Its bridges and structures have been thoroughly repaired; 10 engines and 375 freight cars added to the plant, 16,000 tons of steel rails laid, and 4,000 tons more purchased. The line has been extended 3¾ miles to East Cairo, and a new incline built opposite the Illinois Central freight depot. The traffic of the line was impeded for several months by the yellow fever, which also interrupted construction work. Before this occurred, 50 miles of road had been ballasted; this, with the new rails, placed the track in good condition for the winter traffic. The sum of $1,199,000, due to the state of Tennessee, was paid, the state lien being preserved for the benefit of new bonds in the same amount, of which $638,000 bonds were used to refund the money advanced to pay the state. The new company has applied the balance of Tennessee lien bonds to substantial improvements, at the same time paying from its net earnings the coupons on the prior mortgages, including the new first-mortgage bonds. It has no floating debt. When the traffic again reaches the average of the four years immediately preceding 1878, the net income should provide for interest payments on the second mortgage income bonds. Of these the Illinois Central company owns $4,983,000, besides 62,792 of the 86,636 shares issued by the Southern company."

Washington City, Virginia Midland & Great Southern.

The company operates the following lines:

	Miles.	
Alexandria & Lynchburg Div., Alexandria, Va., to Lynchburg	170.60	
Warrenton Branch	8.50	
		179.10
Manassas Division, Manassas Junction to Harrisonburg	111.68	
Front Royal Branch	0.82	
		112.50
Danville Division, Lynchburg to Danville		67.90
Total		359.50

All of this is owned except 22 miles of the Alexandria & Lynchburg Division, from Charlottesville to Gordonsville, the use of which is leased from the Chesapeake & Ohio; of the Manassas Division 49.13 miles, from Strasburg to Harrisonburg, are leased to the Baltimore & Ohio, making the mileage owned 337.50, and worked, 310.37 miles. The figures below are from a report prepared by counsel at the request of a committee of bondholders.

The debt of the company consists of first, second, third and fourth mortgage Orange & Alexandria bonds, prior liens upon the Alexandria & Lynchburg Division, with funded and other overdue coupons; first-mortgage Manassas Gap bonds; first and second-mortgage Orange, Alexandria & Manassas bonds, with funded and overdue coupons, which are secondary liens on the Alexandria & Lynchburg and Manassas divisions; first-mortgage Lynchburg & Danville bonds, a first lien on that division, and first general-mortgage bonds with overdue interest. The suits now pending are for foreclosure of the two general mortgages. The debt, including overdue interest, may be summed up as follows:

Alex. & Lynch. Div., prior liens ($28,648 per mile)	$4,500,522
Manassas Div., first lien ($759 per mile)	85,335
Two divisions, secondary liens ($7,448 per mile)	2,008,0 0
Danville Div., first lien ($28,866 per mile)	1,960,000
General liens ($4,444 per mile)	1,500,000
Total mortgage liens ($20,790 per mile)	$10,053,907
Floating debt	810,000
Total	$10,863,907

Of the floating debt $60,000 are judgments partly secured. There is $58,350 preferred and $4,292,089 common stock; total stock, $4,350,089.

The above statement does not include 350,000 third-preferred lien, formerly held by the State of Virginia, and paid in 1872, but now claimed by the Baltimore & Ohio Company. It does include about $190,000 past-due coupons on Orange & Alexandria first and second-mortgage bonds held by the Baltimore & Ohio, which claims are disputed.

The interest charges on the underlying liens are $545,064 yearly, apportioned as follows: Alexandria & Lynchburg Division, $284,031; Manassas Division, $143,433; Danville Division, $117,600. The earnings for the past two years have been as follows:

Gross Earnings:	1878.	1877.	Increase.	P. c.
Alex. & Lynchburg Div.	$894,405	$736,805	$157,600	21.4
Manassas Div.	190,421	162,721	27,700	17.0
Danville Div.	133,291	105,992	27,299	25.7
Total	$1,218,117	$1,005,518	$212,519	21.1
Expenses:				
Alex. & Lynch. Div.	615,000	521,503	93,497	17.9
Manassas Div.	75,000	72,050	2,950	4.1
Danville Div.	113,000	100,941	12,059	12.0
Total	$803,000	$694,494	$108,506	15.6
Net Earnings:				
Alex. & Lynch. Div.	279,405	215,302	64,103	29.8
Manassas Div.	115,421	90,671	24,750	27.3
Danville Div.	20,291	5,051	15,240	298.8
Total	$415,117	$311,025	$104,093	33.5

The chief revenue of the Manassas Division is the $89,250 rent paid for the section leased by the Baltimore & Ohio. The average results last year were as follows:

	Gross earn. per mile.	Net earn. per mile.	Per cent. of exps.
Alex. & Lynch. Div.	$4,994	$1,560	68.78
Manassas Div.	1,693	1,026	39.39
Danville Div.	1,963	299	84.77
Whole road.	$3,416	$1,155	65.93

The chief points involved in the litigation are the priorities as between the holders of the liens on the different divisions. It is claimed also that the Manassas and Danville divisions are entitled to some allowance for business brought to the main line, or at least to a terminal charge. Other points are the claims of the Baltimore & Ohio to some $190,000 over-due coupons; to hold a preferred third lien for $350,000 for advances to pay off the debt to the state of Virginia, and to the right to pay rental in overdue coupons. This last point has been decided in its favor by the Virginia Circuit Court.

Delaware.

This company owns a line from Delaware Junction, Del., South to Delmar, 84.25 miles; the Smyrna Branch, 1.25 miles; a branch from Townsend to Massey's, 9 miles, and one from Seaford to the Maryland line, 6 miles, making 100.5 miles. The Massey's Branch is leased to the Queen Anne's & Kent, and the Seaford Branch to the Dorchester & Delaware, leaving 85.5 miles worked. The road is leased to the Philadelphia, Wilmington & Baltimore for 30 per cent. of the earnings; the lessee pays all interest and 6 per cent. dividends, a deficit in any year to be repaid from the earnings of future years.

For the year ending Oct. 31, the train mileage was as follows:

	1877-78.	1876-77.	Inc. or Dec.	P. c.
Passenger	130,499	95,023	I. 35,476	37.3
Freight	138,489	171,272	D. 32,783	19.1
Service	3,460	4,422	D. 962	21.9
Total	272,448	270,717	I. 1,731	0.6

The earnings for the year were as follows:

	1877-78.	1876-77.	Inc. or Dec.	P. c.
Passengers	$140,408.05	$134,531.45	I. $5,876.60	4.4
Freight	215,184.59	273,123.64	D. 57,°39.05	21.2
Mail, etc	9,987.49	12,150.75	D. 2,163.26	17.7
Total	$365,580.13	$419,805.84	D. $54,225.71	12.9
Paid lessee 70 per cent. for working.	255,906.09	293,864.09	D. 37,958.00	12.9
Net earnings.	$109,674.04	$125,941.75	D. $16,267.71	12.9
Interest and dividends	132,758.00	123,730.37	I. 9,027.63	7.3
Deficit.	$23,083.96			
Surplus.		$2,211.38		
Gross earnings per mile	4,275.79	4,910.01	D. 634.22	12.9
Net earn. per mile.	1,282.74	1,473.00	D. 190.26	12.9

The decrease in earnings is due entirely to the partial failure of the peach crop, which furnishes directly or indirectly a large part of the traffic of the road.

The lessee has maintained the road, buildings and bridges in good condition, and has laid 500 tons of steel rails and 36,420 new ties. The lessee has also made, with the consent of the lessor, additions and improvements to the amount of $6,485.39, which has been charged to construction account. These improvements and additions consist in the difference in cost between steel and iron rails, the substitution of iron fish-plates for joint-block fastenings, the new passenger station at Canterbury and additional fencing along the line of the road.

The sinking fund increased $9,740.37, and now amounts to $46,031.50. There are now outstanding only $9,600 of the bonds loaned by the state of Delaware, which the sinking fund is provided to meet, so that a considerable surplus will remain after their payment.

Troy & Boston.

This company works a line from Troy, N. Y., to North Adams, Mass., 47.51 miles, with a branch to Bennington, Vt., 5.38 miles, making 52.89 miles in all. The line owned is from Troy to State Line, 34.74 miles; the main line from State Line to North Adams, 12.77 miles, is leased from the state of Massachusetts, and the Bennington Branch from the Troy & Bennington Company. The figures given are from the report to the State Engineer of New York for the year ending Sept. 30, 1878.

The stock and debt are as follows:

Stock ($46,316 per mile)	$1,609,010.00
Funded debt ($62,622 per mile)	2,179,500.00
Floating debt	436,022.16
Total ($121,604 per mile)	$4,224,532.16
Road and equipment ($82,143 per mile)	2,853,762.49

The passengers and freight carried were:

	1877-78.	1876-77.	Inc. or Dec.	P. c.
Passengers	294,879	301,072	D. 6,193	2.1
Tons freight	595,904	425,051	I. 170,853	40.2

The increase in freight tonnage is chiefly in through freight for the Hoosac Tunnel Line. The earnings were:

	1877-78.	1876-77.	Inc. or Dec.	P. c.
Passengers	$174,490.38	$187,405.40	D. $12,915.02	6.9
Freight	363,980.73	350,380.92	I. 13,599.81	3.9
Other sources	21,872.63	22,977.73	D. 1,105.10	4.8
Total	$560,343.74	$560,764.05	D. 420.31	0.1
Expenses	285,596.61	284,150.15	I. 1,446.46	0.5
Net earn.	$274,747.13	$276,613.90	D. $1,866.77	0.7
Gross earn. per mile	10,594.51	10,602.46	D. 7.95	0.1
Net "	5,194.71	5,230.04	D. 35.33	0.7
Per cent. of exps.	50.96	50.67	I. 0.29	0.6

The disposition of net earnings was as follows:

Net earnings		$274,747.13
Interest	$200,735.43	
Dividends	30,073.00	
Rentals, etc	31,515.30	
		262,323.73
Balance to surplus fund		$12,423.40

The increase in through tonnage has brought but a slight gain in freight earnings, and there was a considerable decrease in passenger receipts. The total earnings were but very slightly different from last year. The floating debt was increased $64,045.38 during the year.

The road will probably be seriously affected by the completion of the Boston, Hoosac Tunnel & Western, which will compete for the through and part of the local business.

LOCOMOTIVE RETURNS, OCTOBER, 1878.

Master Mechanics of all American railroads are invited to send us their monthly returns for this table.

Name of Road.	Number of miles operated	Number of Locomotives in service	Mileage. Total	Mileage. Average per Engine.	Miles run to Ton of Coal.	Miles run to Cord of Wood.	Miles run to Pint of Oil.	Average No. of freight cars hauled	Average cost per freight car per mile, cents.	Cost per Mile in Cents for Repairs.	Fuel.	Stores.	Miscellaneous.	Engineers, firemen and wipers.	Total.	Average Cost of Coal per ton.	Average Cost of Wood per cord.
																$	$
Allegheny Val., River Div.*	139	42	92,936	2,213	40.48	....	25.31	21.50	0.641	4.27	3.12	0.46	....	6.04	13.89	....	....
Low Gr'de Div.*	120	19	45,220	2,380	31.49	....	24.16	19.00	0.627	0.87	3.55	0.55	....	5.78	10.75	....	....
Atlantic & Great Western, 1st & 2d Divs.	228	83	242,012	2,927	36.03	....	18.78	17.10	....	4.43	5.52	0.45	0.60	5.82	16.82	1.90	2.85
3d & 4th Divs.	197	50	152,099	3,042	33.70	....	31.70	15.70	....	4.77	5.02	0.28	0.59	5.43	16.09	1.59	2.85
Mahoning Div.	88	53	135,214	2,551	38.12	....	20.58	18.90	....	3.80	5.02	0.43	0.43	5.42	15.10	1.81	2.85
Atlantic & Gulf	343	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Camden & Atlantic	67	11	18,817	1,711	58.90	....	11.55	....	....	5.40	6.58	0.82	....	5.30	18.10	3.88	....
California Pacific†	178	17	44,595	2,623	35.44	....	17.39	....	....	3.11	17.37	0.57	0.77	7.45	29.27	6.00	6.00
Cen. Pac., Western Div.†	128	28	70,738	2,526	43.93	....	15.55	....	....	6.07	13.93	0.57	0.38	8.08	29.03	6.00	6.00
Northern & San Pablo & T.†	158	36	92,000	2,556	39.90	....	15.46	....	....	8.49	15.31	0.58	0.37	6.84	31.59	6.00	6.00
Visalia Div.†	157	11	25,977	2,362	44.21	....	15.37	....	....	9.69	13.78	0.58	0.11	7.19	31.35	6.00	6.00
Tulare Div.†	171	11	23,307	2,119	37.29	....	11.91	....	....	5.86	16.31	0.75	0.34	6.95	30.21	6.00	6.00
Los Angeles, San Diego, Yuma & Wilmington Divs.†	417	19	56,301	2,963	59.80	....	15.98	....	....	5.42	10.24	0.56	0.93	7.14	23.39	6.00	6.00
Sacramento Div.†	120	36	90,145	2,504	....	26.04	15.97	....	....	2.60	23.05	0.56	0.39	9.08	35.68	....	6.00
Oregon Div.†	152	7	21,674	3,096	36.05	32.94	17.79	....	....	1.38	21.09	0.53	0.20	7.85	31.05	6.00	6.00
Truckee Div.†	205	25	70,522	2,821	35.02	27.95	16.35	....	....	9.58	19.22	0.54	0.35	8.25	37.94	6.00	6.00
Humboldt Div.†	200	19	54,598	2,872	44.24	....	20.07	....	....	8.04	13.82	0.46	0.39	7.38	30.09	6.00	6.00
Salt Lake Div.†	219	28	74,284	2,653	34.51	....	15.35	....	....	5.40	17.60	0.61	0.52	7.78	31.91	6.00	6.00
Stockton & Copperopolis†	49	3	5,195	1,732	57.14	45.73	8.44	....	....	4.54	13.14	1.07	1.08	8.47	28.30	6.00	6.00
Chicago & Eastern Illinois‡	153	28	85,631	3,058	35.00	....	21.00	....	....	3.43	3.40	0.32	....	5.08	12.83	....	....
Cin., Lafayette & Chicago.	75	10	35,605	3,561	38.32	....	15.11	....	....	1.77	5.93	0.30	....	6.21	14.21	2.25	....
Cleve., Col., Cin. & Ind., Columbus Div.	138	58	162,945	2,809	38.13	....	32.33	....	....	1.74	4.85	0.42	0.53	6.00	13.54	1.75	....
Indianapolis Div.	203	63	177,441	2,817	43.48	....	24.25	....	....	3.51	4.56	0.54	1.02	5.72	15.35	1.75	....
Cincinnati Div.	130	36	98,301	2,731	50.13	....	25.63	....	....	4.17	5.38	0.47	0.65	5.00	13.72	1.55	....
Cleveland & Mahoning Valley.	41	6	14,418	2,403	46.51	....	28.21	12.00	....	1.36	3.01	0.21	1.19	6.23	12.00	1.23	2.64
Cleveland & Pittsburgh*	225	79	195,935	2,480	46.95	....	19.00	18.80	0.690	2.98	2.59	0.44	1.82	6.19	14.02	1.10	3.73
Cleveland, Tuscarawas Valley & Wheeling	101	14	42,210	3,015	33.99	....	17.48	....	....	3.62	1.30	0.47	....	5.50	10.89	....	....
Del., Lackawanna & Western, Bloomsburg Div.§	80	20	52,146	2,607	....	....	32.78	....	....	3.31	....	0.51	....	4.30	7.12	....	....
Erie & Pittsburgh*	98	28	64,033	2,287	40.69	....	19.36	18.00	0.854	3.53	3.81	0.44	1.82	6.12	15.72	1.55	1.55
Grand Trunk, Portland Div.	....	42	84,002	2,000	41.11	....	....	21.60	....	....	....	....	....	....	....	....	....
Eastern Div.	....	60	156,881	2,615	....	....	....	20.50	....	....	....	....	....	....	....	....	....
Champlain Div	....	8	19,108	2,389	46.76	....	....	20.10	....	....	....	....	....	....	....	....	....
Central Div.	....	134	392,754	2,931	42.65	....	....	23.00	....	....	....	....	....	....	....	....	....
Western Div.	....	89	231,492	2,598	45.29	....	....	19.30	....	....	....	....	....	....	....	....	....
Buffalo Div.	....	21	59,692	2,842	52.36	....	....	19.30	....	....	....	....	....	....	....	....	....
Detroit Div.	....	16	52,204	3,268	37.40	....	....	22.60	....	....	....	....	....	....	....	....	....
Green Bay & Minnesota‡	240	14	30,567	2,183	40.25	37.75	20.76	18.06	....	1.88	6.47	0.24	0.05	4.27	12.91	3.40	2.25
Houston & Texas Central¶	498	59	173,551	2,941	45.40	39.70	15.00	....	....	4.97	6.76	0.49	0.88	6.61	19.74	3.05	2.85
Ill. Cen., Chicago Div.‖	253	60	167,574	2,793	35.59	....	17.52	20.54	....	2.85	5.24	0.27	....	5.77	14.14	1.75	4.20
South Div.‖	227	28	70,509	2,518	39.44	....	16.92	16.75	....	3.32	4.71	0.27	....	5.65	13.95	1.75	4.20
North Div.‖	231	37	91,082	2,461	33.22	....	18.34	13.38	....	4.72	5.55	0.28	....	5.81	16.37	1.75	4.20
Springfield Div.‖	113	12	23,830	1,986	36.39	....	18.86	14.78	....	2.71	4.24	0.29	....	5.38	12.62	1.45	2.65
Iowa Div.‖	401	43	105,970	2,464	29.50	....	16.88	14.00	....	3.25	9.08	0.29	....	5.86	18.48	2.60	4.90
Jeff'nville, Madison & Ind'p*	226	43	100,188	2,330	42.94	29.15	15.53	20.38	1.020	3.83	6.03	0.39	1.78	5.50	17.53	2.40	2.20
Kansas City, St. Jo. & Council Bluffs**	271	31	106,425	3,433	50.60	....	27.80	17.30	....	4.30	5.70	0.30	....	6.40	16.70	2.75	3.50
Kansas Pacific¶	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
L. S. & M. S., Buffalo Div.‡	....	89	182,096	2,046	39.64	46.12	22.75	....	....	5.06	7.54	0.30	....	5.81	18.74	2.85	5.69
Erie Division‡	....	113	254,479	2,252	33.84	....	27.23	....	....	3.85	7.71	0.28	....	5.42	17.27	2.49	5.43
Toledo Division‡	....	85	147,181	1,731	27.32	60.46	19.76	....	....	5.01	10.54	0.38	....	5.24	21.20	2.92	4.08
Mich. Southern Division‡	....	208	393,908	1,894	39.14	56.24	22.25	....	....	4.97	8.56	0.28	....	5.88	19.58	3.35	4.63
Louisville, Cin. & Lexington‡	213	....	93,084	....	36.07	....	12.73	....	....	3.52	6.58	0.47	2.31	6.00	18.88	2.00	3.00
Louisv'e & Nash., First Div.‡	332	53	116,756	2,203	27.61	....	14.28	20.16	1.360	4.85	7.51	0.49	1.38	6.94	21.17	1.99	2.40
Second Div.‡	200	38	78,528	2,066	30.16	....	13.56	15.52	1.400	3.38	6.55	0.47	1.78	6.19	18.37	1.94	2.60
Memph. Div.‡	131	16	24,751	1,547	28.36	....	9.44	16.29	1.790	3.50	10.86	0.61	2.33	5.94	23.24	3.05	2.30
Nashville & Decatur Div.‡	122	31	45,586	1,471	29.35	....	13.01	16.24	1.750	2.99	9.38	0.50	1.55	6.56	20.98	2.62	3.03
S. & N. Alabama R. R.‡	183	33	68,638	2,080	32.90	....	11.93	16.28	1.480	3.40	7.15	0.67	1.30	6.43	18.95	2.24	2.42
Marq., Hought'n & Ontonagon	88	24	28,693	1,196	41.02	....	28.58	70.45	....	0.75	10.15	0.51	....	5.86	17.27	4.00	....
Northern Central, Elmira & Canandaigua Divs.	147	44	102,223	2,323	33.84	....	21.74	....	....	5.69	5.50	0.59	....	5.83	17.61	1.80	2.08
Penn., New York Div.††	120	118	302,816	2,566	36.02	....	10.68	....	....	4.00	7.80	0.80	....	....	13.20	2.80	4.64
Amboy Div.††	154	41	79,229	1,932	56.63	....	17.18	....	....	4.00	5.00	0.50	....	....	9.50	2.80	4.64
Belvidere Div.††	103	33	51,146	1,550	41.55	....	15.83	....	....	6.50	6.90	0.60	....	....	14.00	2.80	4.65
Philadelphia Div.††	191	144	441,211	3,064	27.33	....	12.66	....	....	4.90	3.80	0.60	....	....	9.30	1.00	2.64
Middle Div.††	132	95	291,053	3,063	28.44	....	17.79	....	....	5.50	3.70	0.50	....	....	9.70	1.00	2.64
Pittsb'h Div.††	221	148	452,894	3,060	27.14	....	15.15	....	....	4.90	4.00	0.60	....	....	9.50	1.00	2.64
Tyrone Div.††	107	29	63,216	2,180	22.99	....	20.66	....	....	6.70	4.40	0.50	....	....	11.60	1.00	2.64
West Penn. Div.††	104	24	54,082	2,253	36.02	....	30.49	....	....	4.10	2.90	0.30	....	....	7.30	1.00	2.65
Lewistown Div.††	56	6	14,113	3,352	34.72	....	17.36	....	....	4.50	2.90	0.50	....	....	7.90	1.00	2.75
Bedford Div.††	57	4	12,970	3,243	28.80	....	23.04	....	....	0.80	3.50	0.40	....	....	4.70	1.00	2.64
Pitts., Fort Wayne & Chicago, Eastern Div.*	371	150	409,281	2,728	43.34	....	22.75	16.60	0.740	2.30	3.02	0.37	1.52	6.08	13.29	1.32	1.32
Pitts., Cin. & St. Louis, Little Miami Div.*	197	38	103,206	2,716	43.06	....	13.47	18.68	0.699	3.65	4.98	0.45	2.43	5.58	17.09	2.10	2.00
P., C. & St. L. Div.*	224	98	245,019	2,500	28.70	....	18.96	19.78	0.810	5.85	2.82	0.39	2.20	5.60	16.86	0.75	2.40
St. Louis, Iron Mt. & So., Arkansas Div.	325	38	120,450	3,169	....	46.70	18.80	....	....	3.03	5.50	0.42	....	6.27	15.22	....	2.57
St. Louis & San Francisco¶	328	....	81,509	....	36.00	....	15.00	....	....	2.57	5.65	0.28	....	5.52	14.02	2.05	1.80
St. Louis K. C. & N., St. L. Div.	208	....	60,745	....	43.70	....	18.10	....	....	3.56	2.33	0.29	....	5.42	11.60	0.95	....
Nashville Div.	145	....	66,030	....	31.10	....	15.90	....	....	3.99	2.27	0.31	....	6.08	12.65	0.68	....
Wabash, Eastern Div.‡‡	250	104	262,382	2,523	37.05	....	10.89	25.19	0.660	5.39	4.72	0.38	....	7.03	17.55	1.75	....
Western Div.‡‡	441	70	204,646	2,924	31.00	....	12.00	21.22	0.880	4.38	4.33	0.31	....	6.56	15.58	1.35	....
West Jersey††	128	18	34,782	1,932	0.84	....	20.16	....	....	2.90	7.10	0.50	....	....	10.50	3.60	4.46

* Five empty cars rated as three loaded ones.
† Switching engines allowed 6 miles per hour; helping engines, actual distance run and 4 miles per hour while waiting trains.
‡ Switching engines allowed 6 miles per hour.
§ Fuel not estimated.
‖ Two empty cars rated as one loaded one.
¶ Switching and work-train engines allowed 6 miles per hour.
** Three empty cars rated as two loaded ones.
†† Engineers', firemen's and wipers' wages not included in cost per mile.
‡‡ Switching engines allowed 6 miles per hour; work-train engines, actual mileage; five empty cars rated as three loaded ones.
The ton of coal is 2,000 lbs., unless otherwise noted; 25 bushels counted to the ton.